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Beemsterboer et al.

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(54) **RETRACTOR SAFETY DEVICE**

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Related U.S. Application Data

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G09F 11/18 (2006.01)

(52) **U.S. Cl.**
USPC **40/515**

(58) **Field of Classification Search**
USPC 160/11, 299; 242/385.4
See application file for complete search history.

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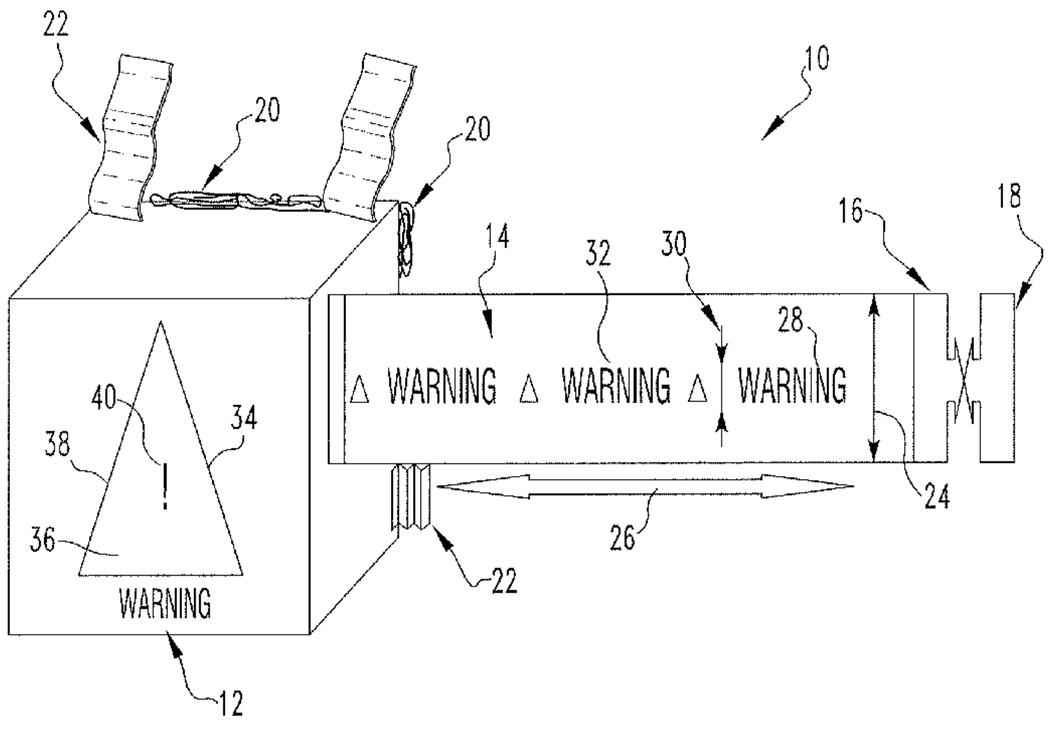
Primary Examiner — Joanne Silbermann
(74) *Attorney, Agent, or Firm* — Peter J. Borghetti; David G. Oberdick

(57) **ABSTRACT**

Retractor safety device for identifying and controlling hazardous areas associated with unmarked, unbarricaded or unprotected areas of Construction and General Industry work sites, as well as any application requiring pedestrian movement-control, designed to meet all required safety standards in terms of color and signage, and will incorporate a variety of elements to promote visibility and ease of use. Retractor safety device is an industrial-grade, reusable caution/danger/hazard tape retractor that attaches by means of a universal mounting bracket, includes a manually- or automatically-operated tape-locking mechanism, as well as a quick-connect, universal tape attachment with Lock-Out, Tag-Out (LOTO) capabilities, and field cleanable/maintainable.

47 Claims, 13 Drawing Sheets



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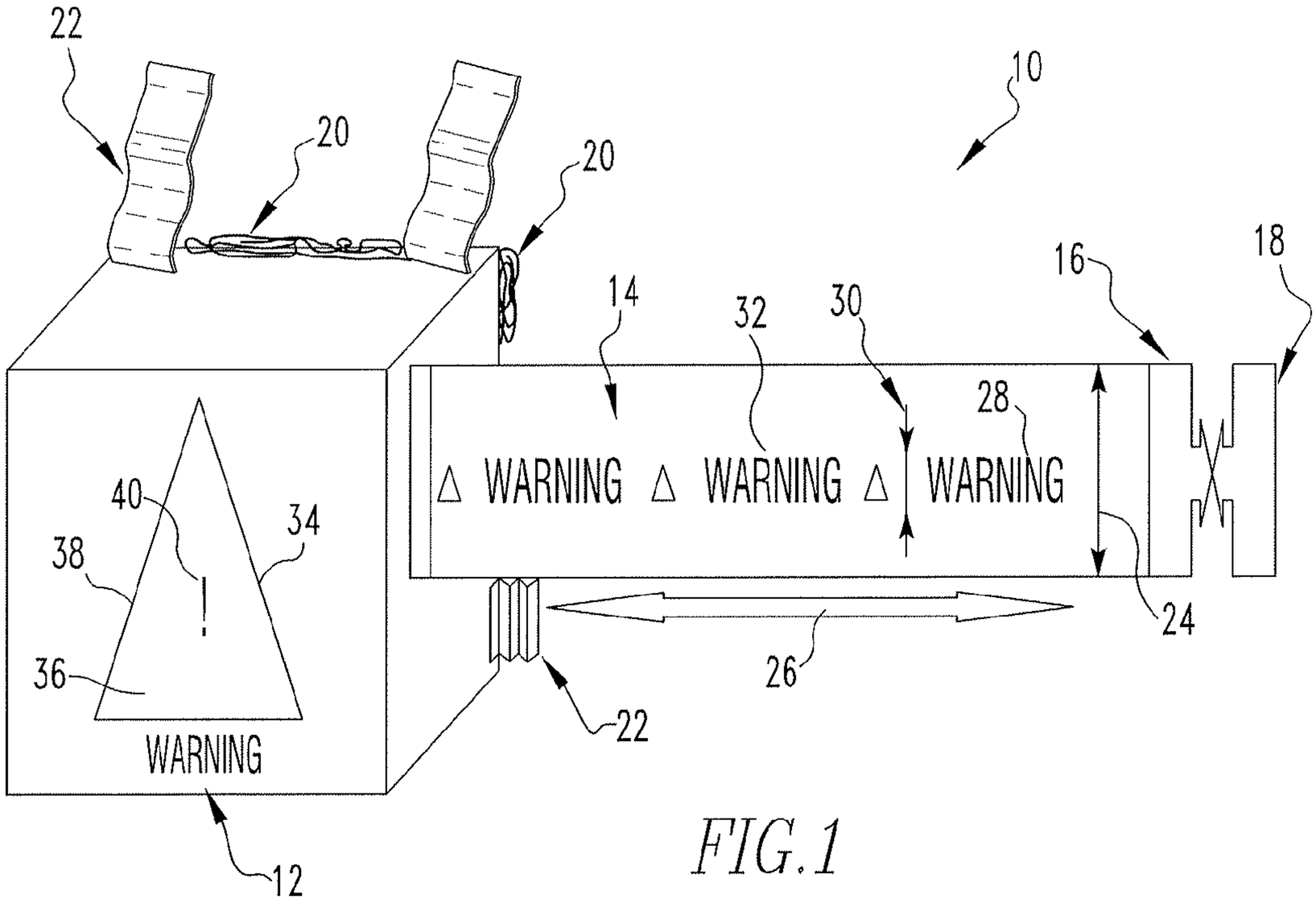
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FIG. 1

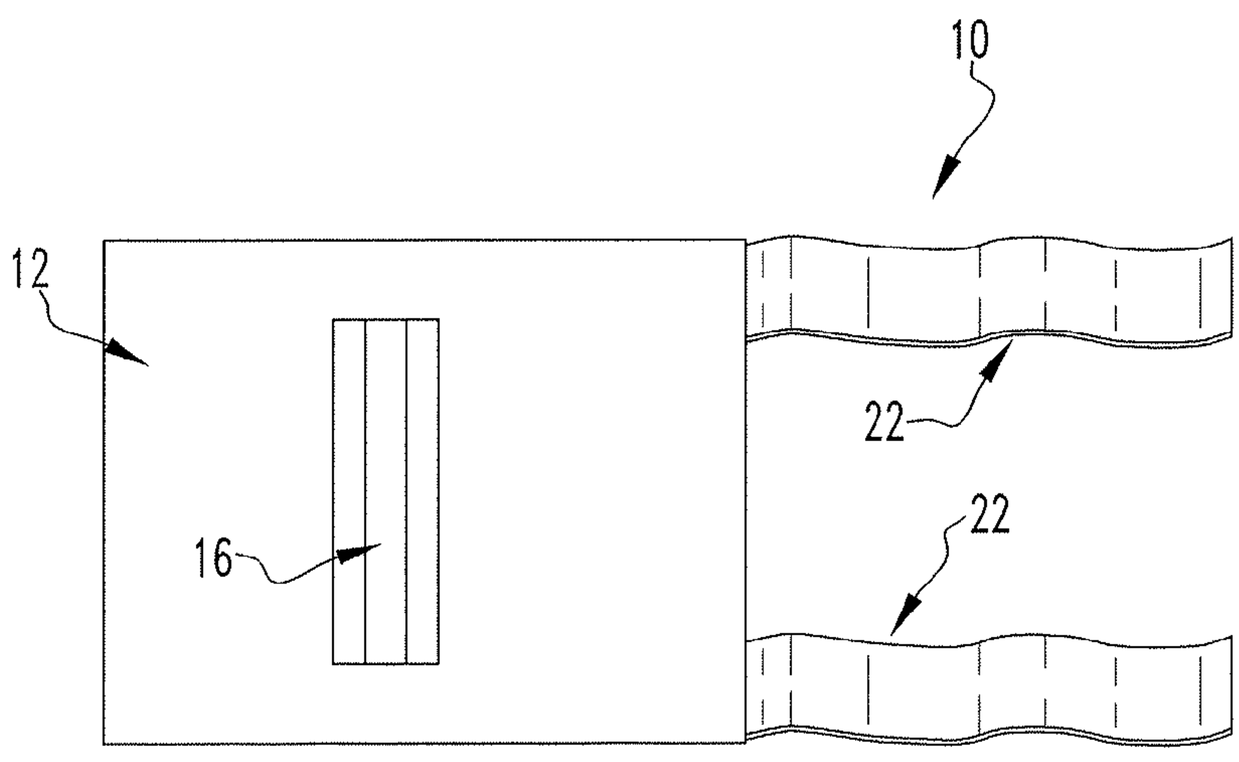
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FIG. 2

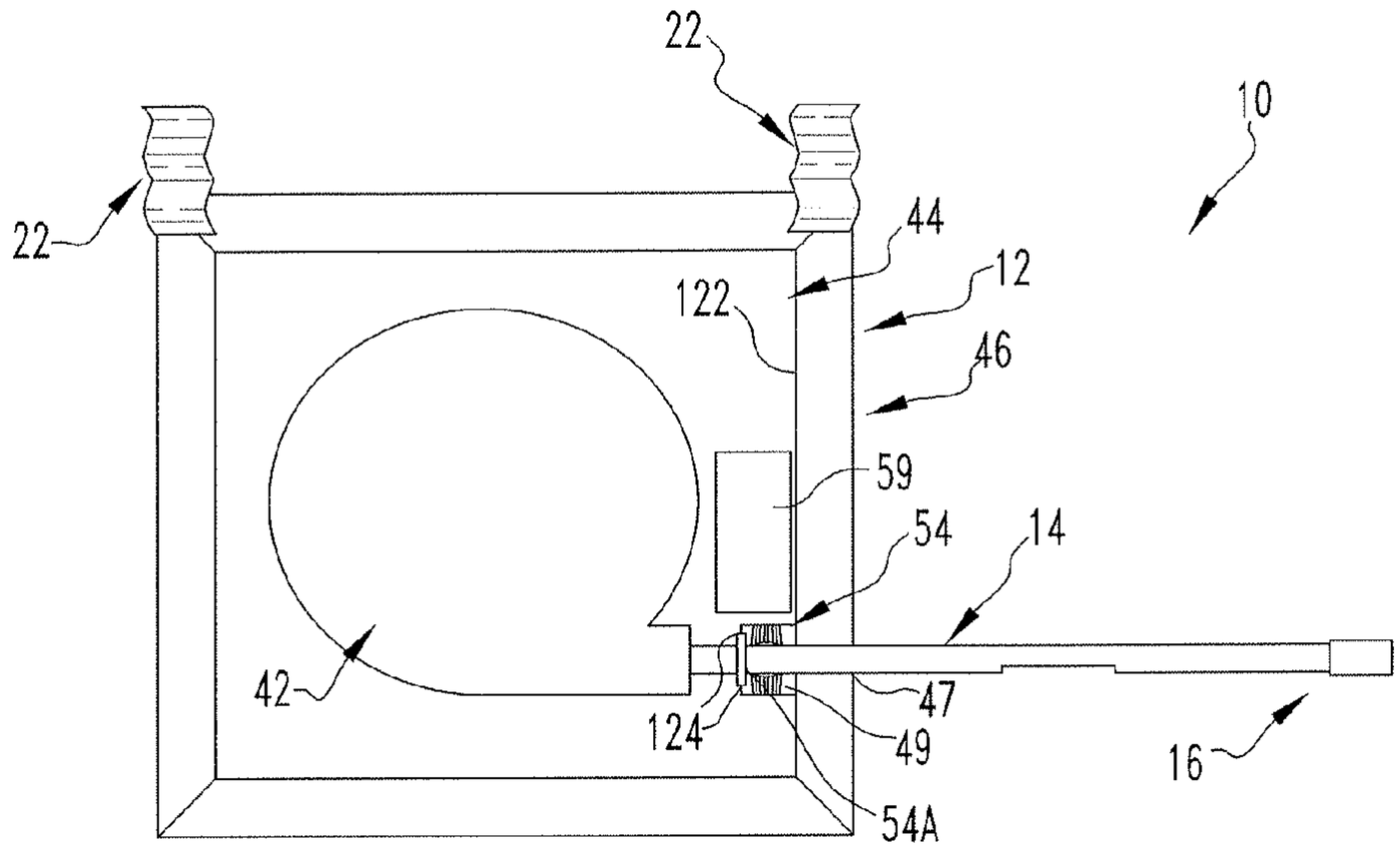
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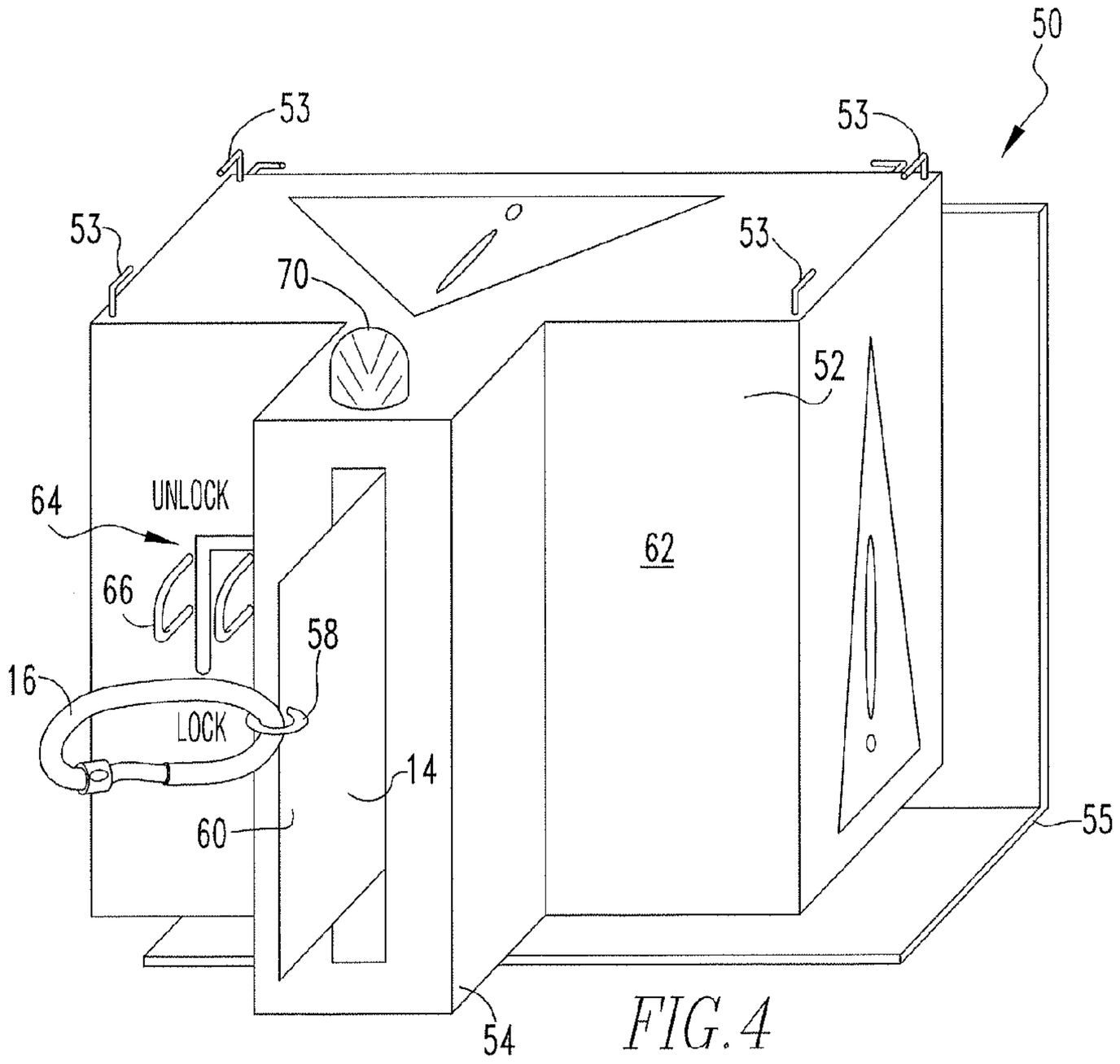
FIG. 3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UNLOCK
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FIG. 4

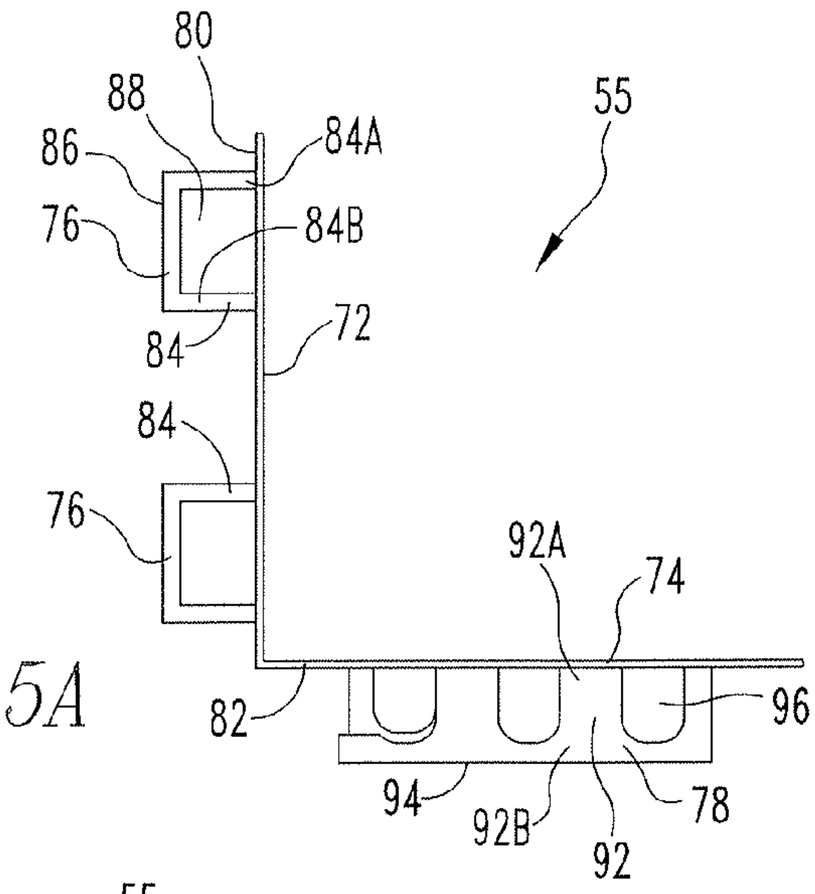

FIG. 5A

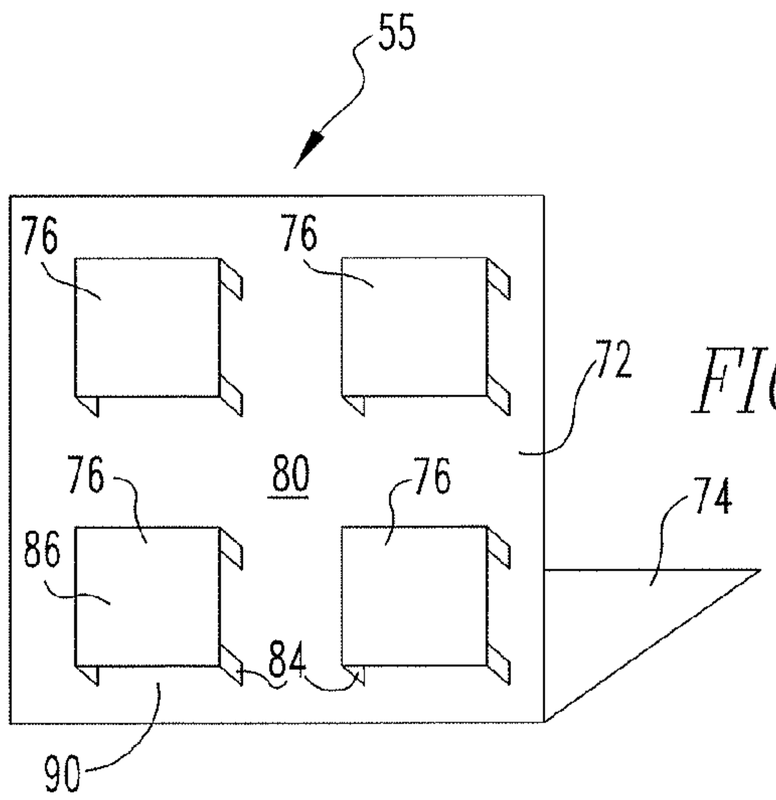

FIG. 5B

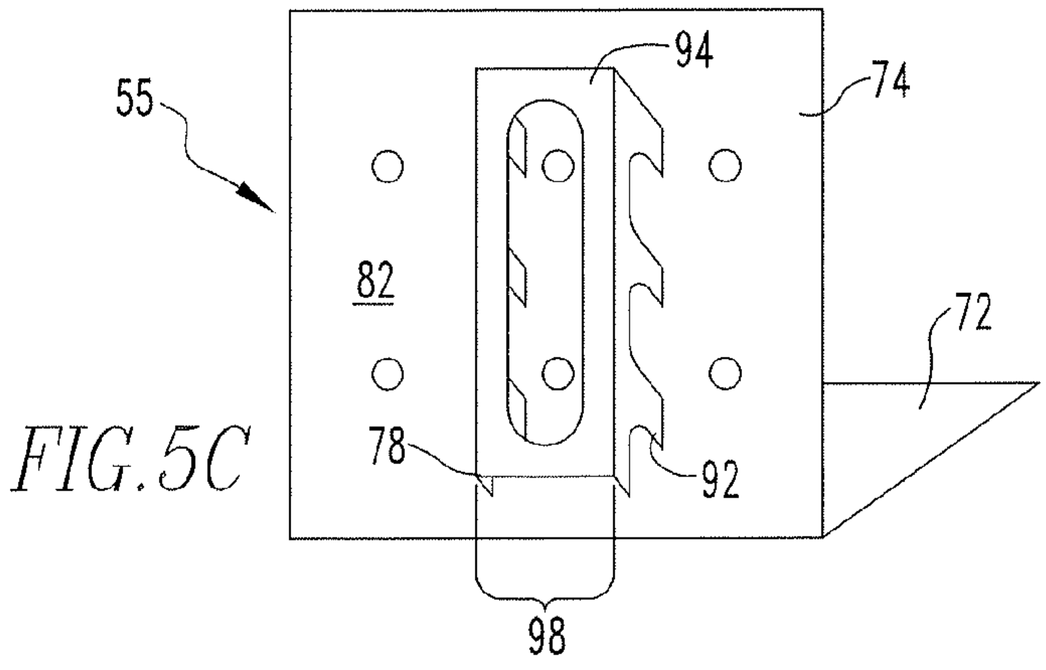

FIG. 5C

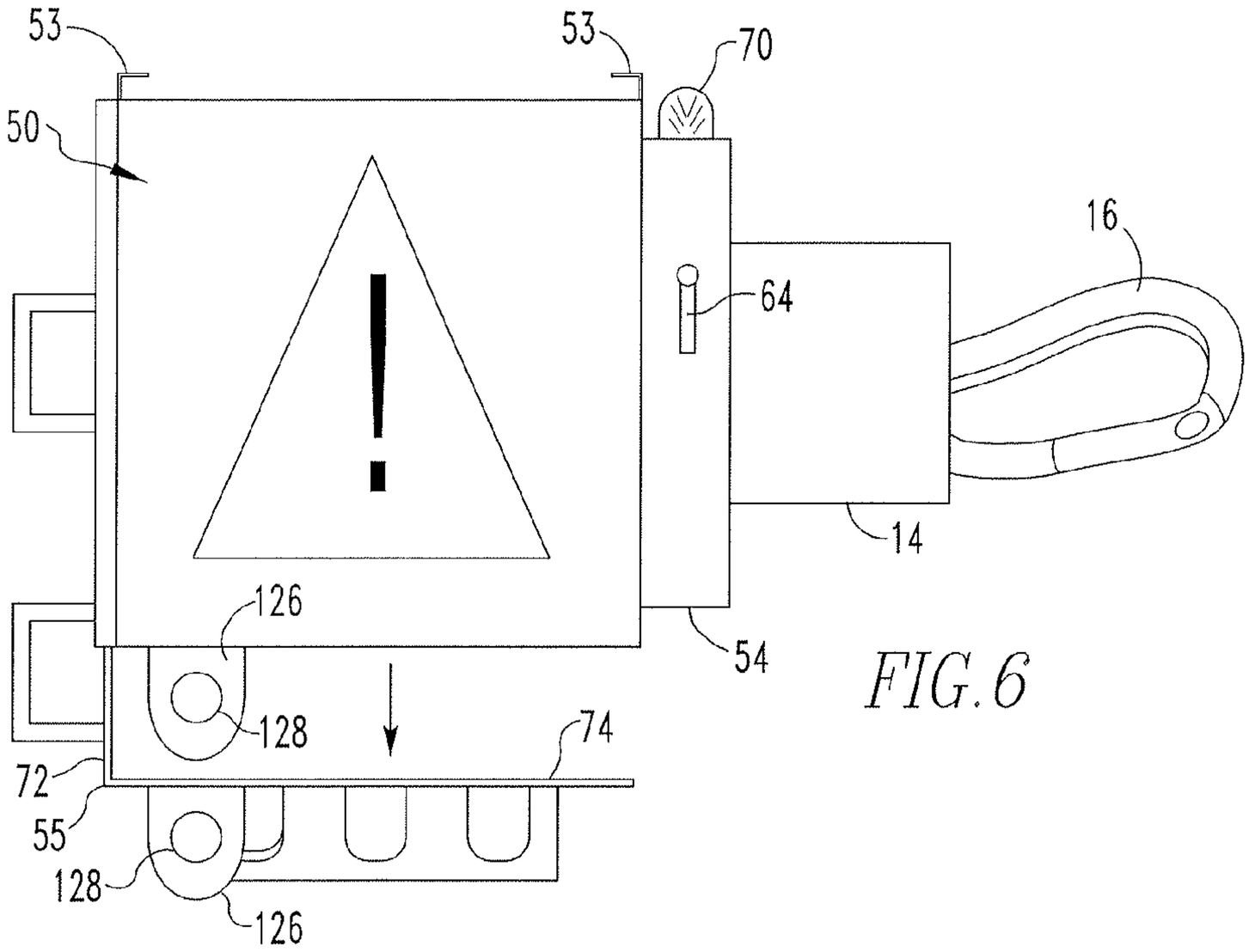

FIG. 6

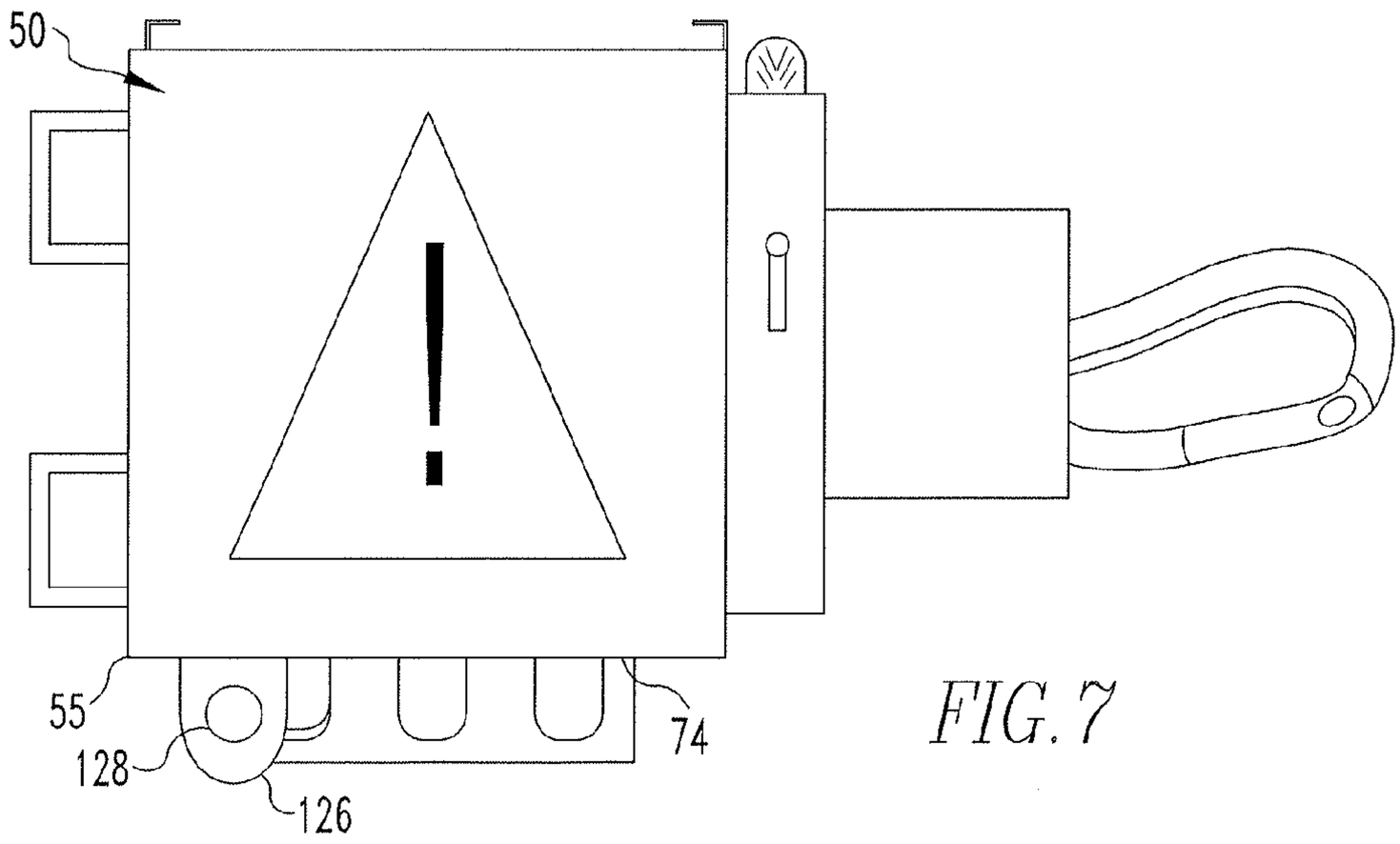

FIG. 7

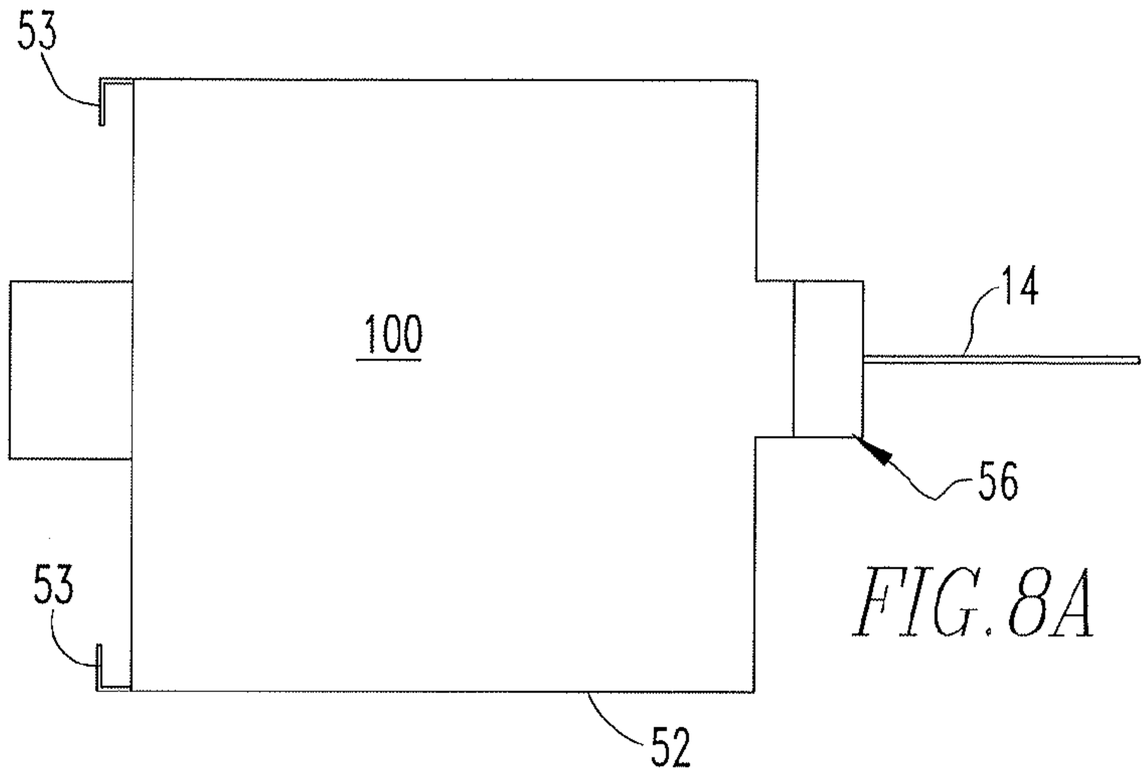

FIG. 8A

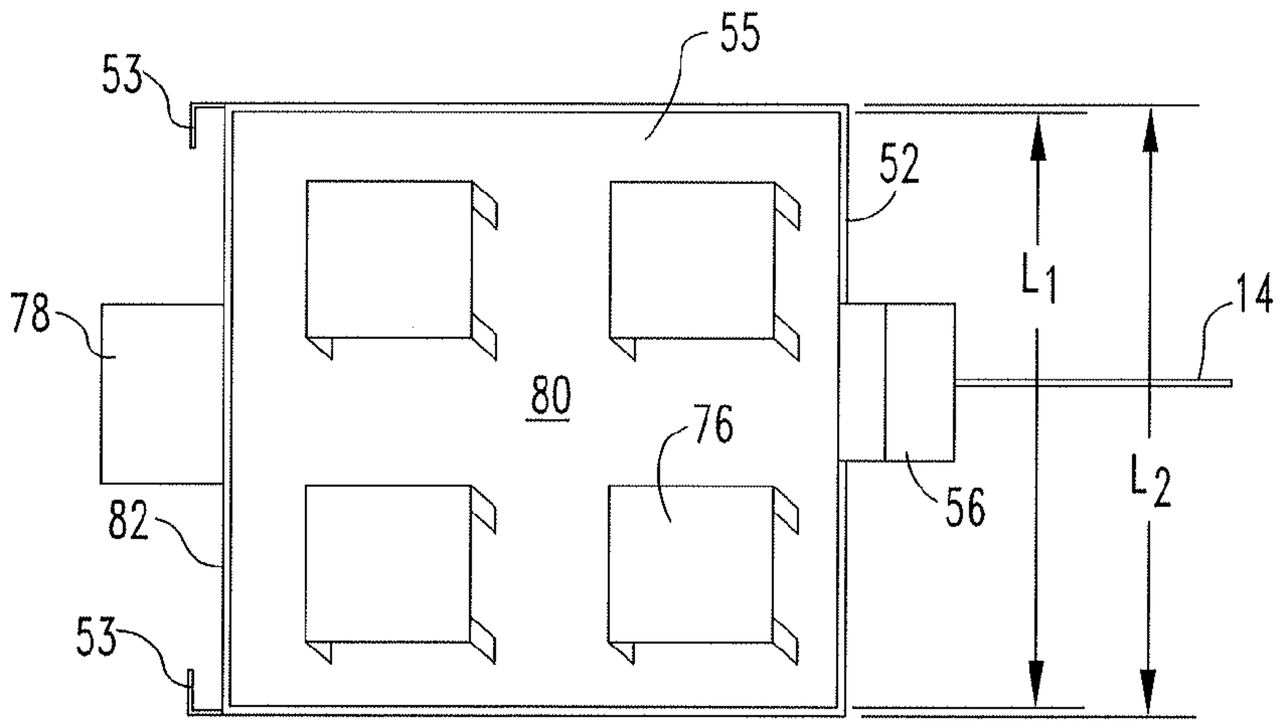

FIG. 8B

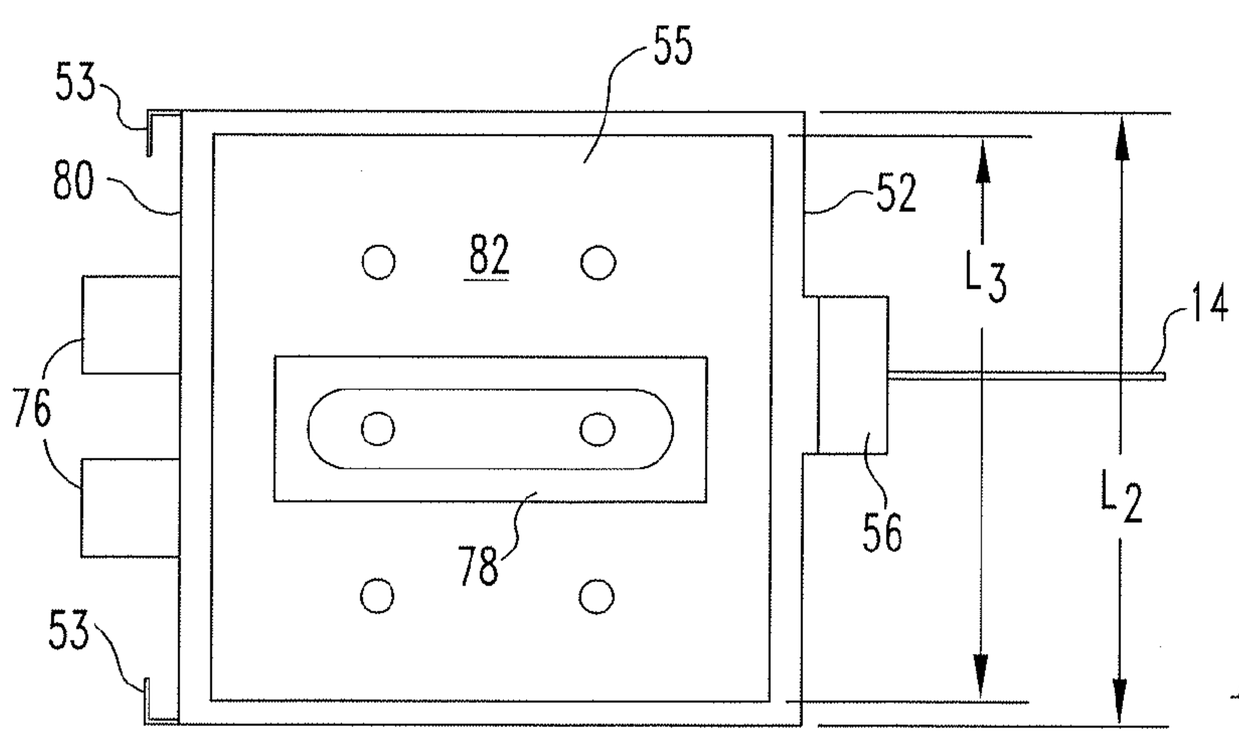

FIG. 8C

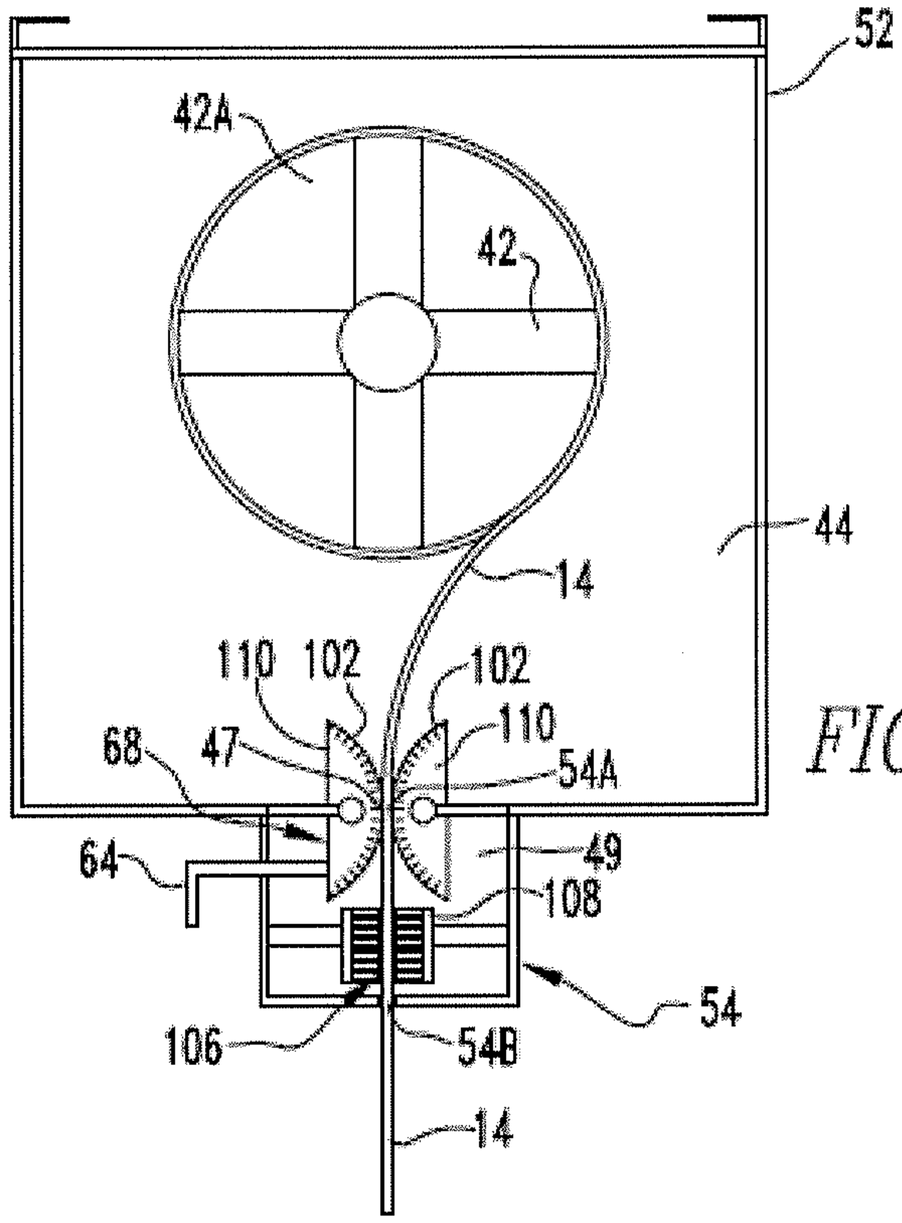

FIG. 9A

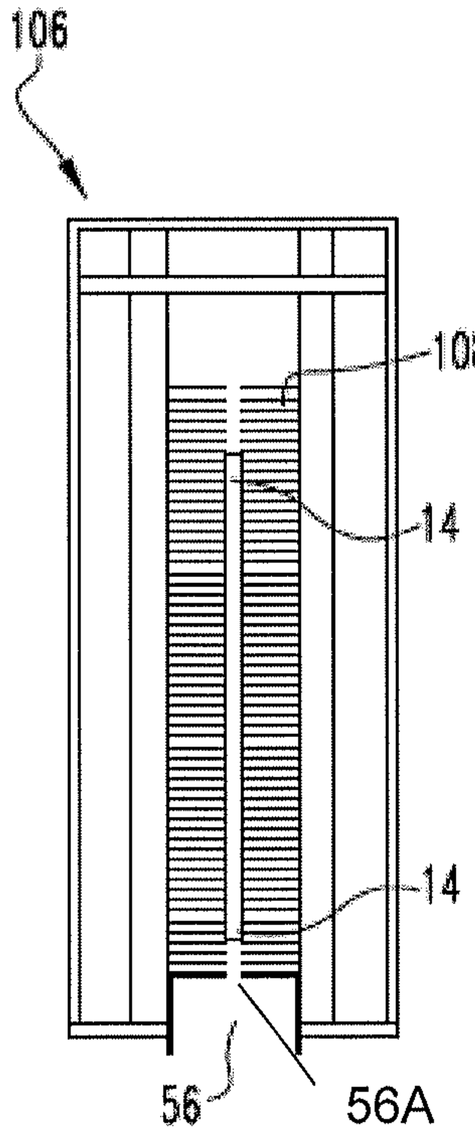

FIG. 9B

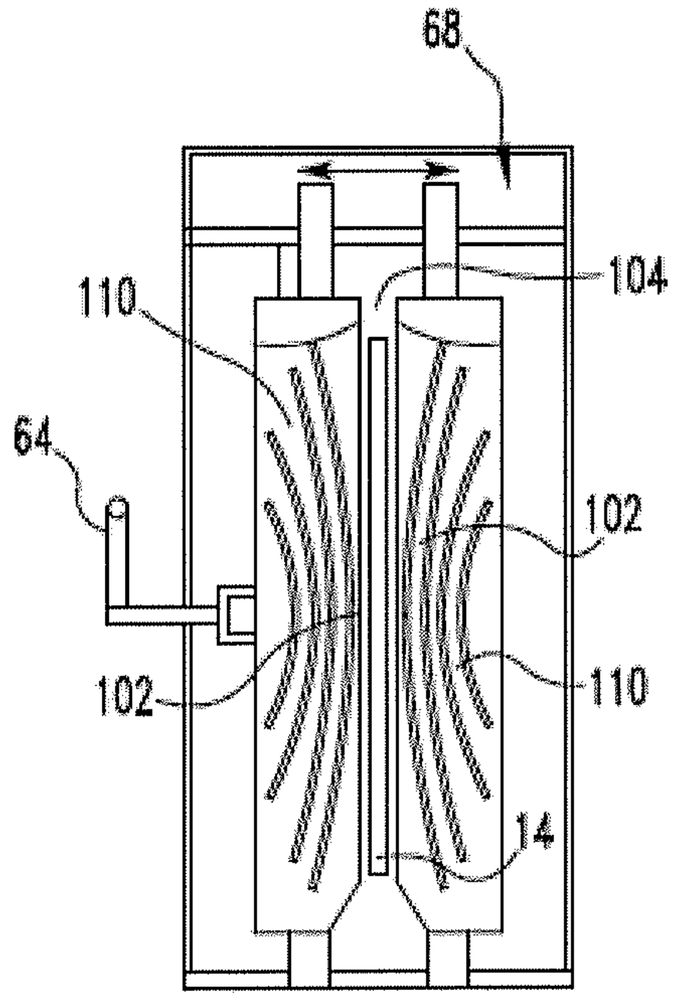

FIG. 9C

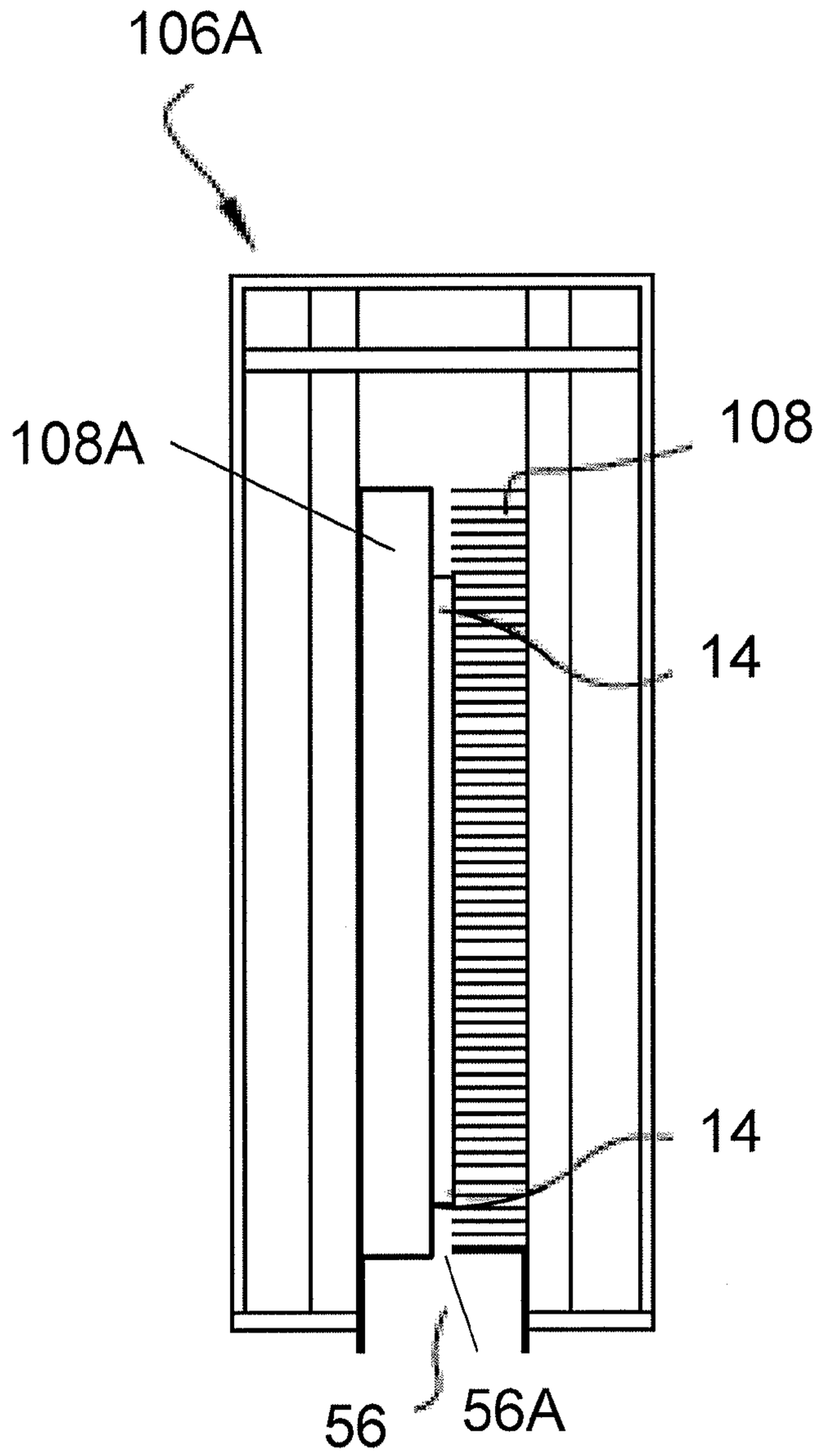

FIG. 9D

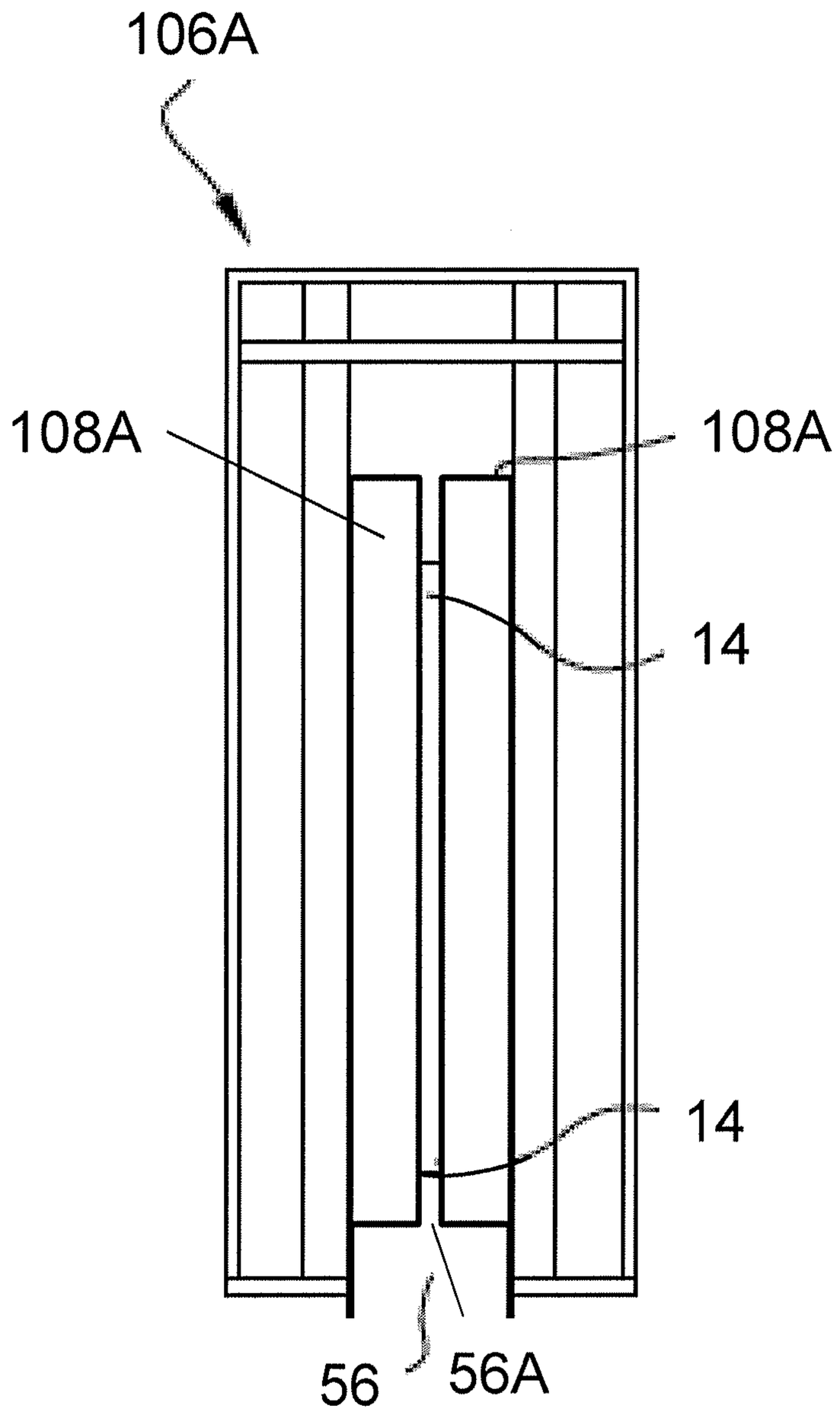

FIG. 9E

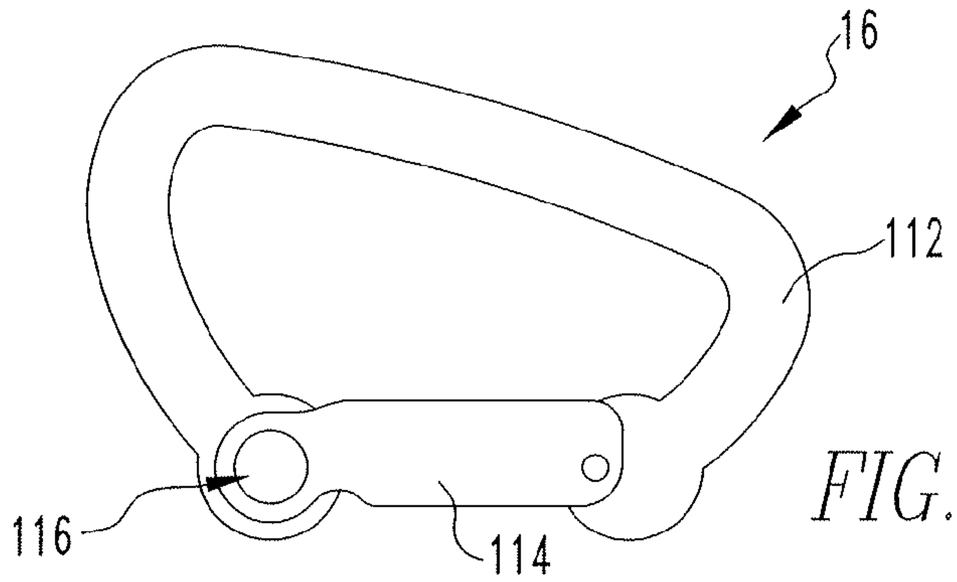

FIG.10A

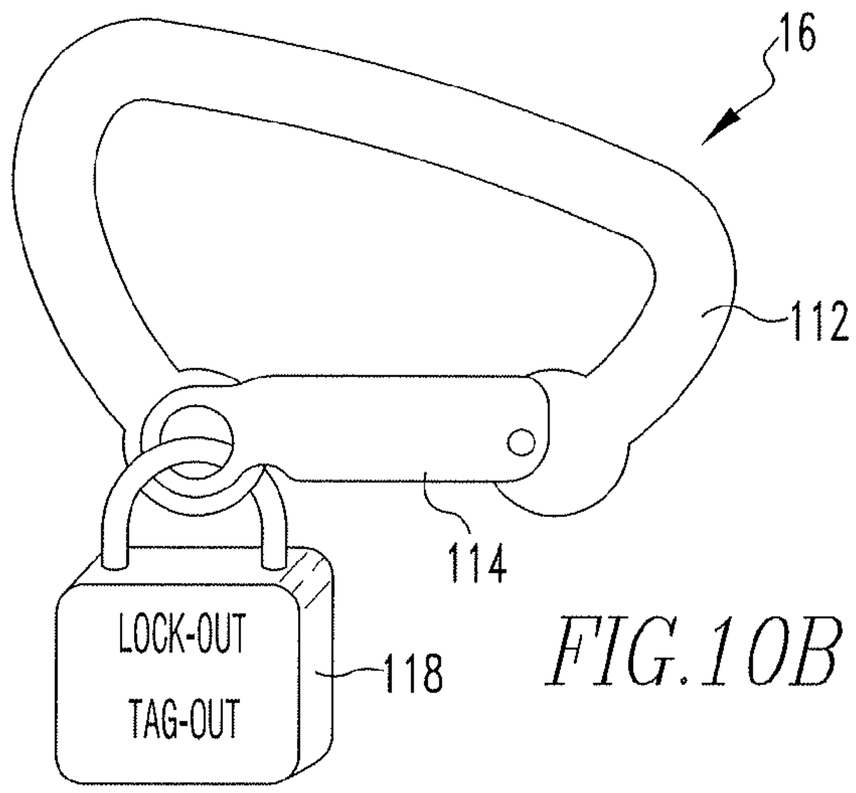

FIG.10B

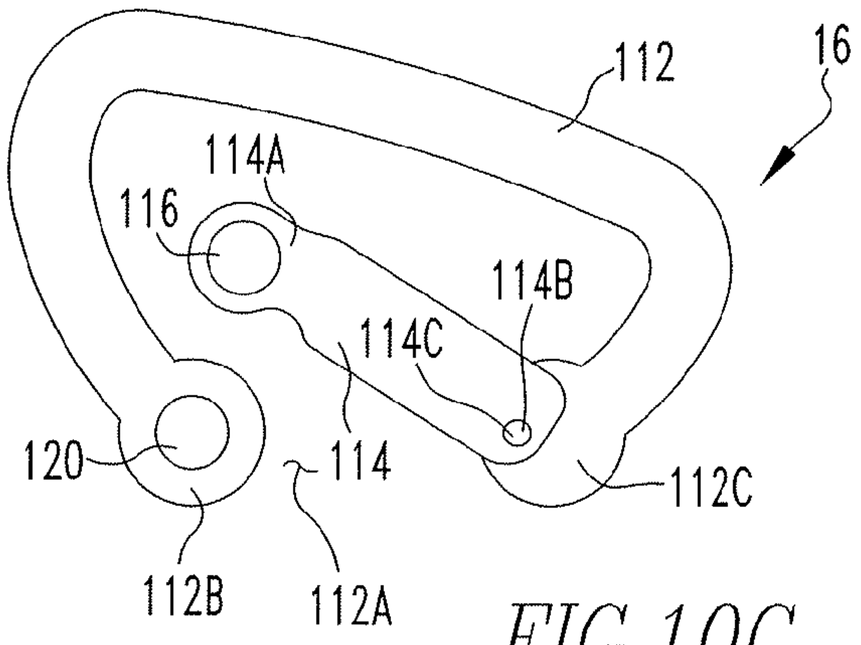

FIG.10C

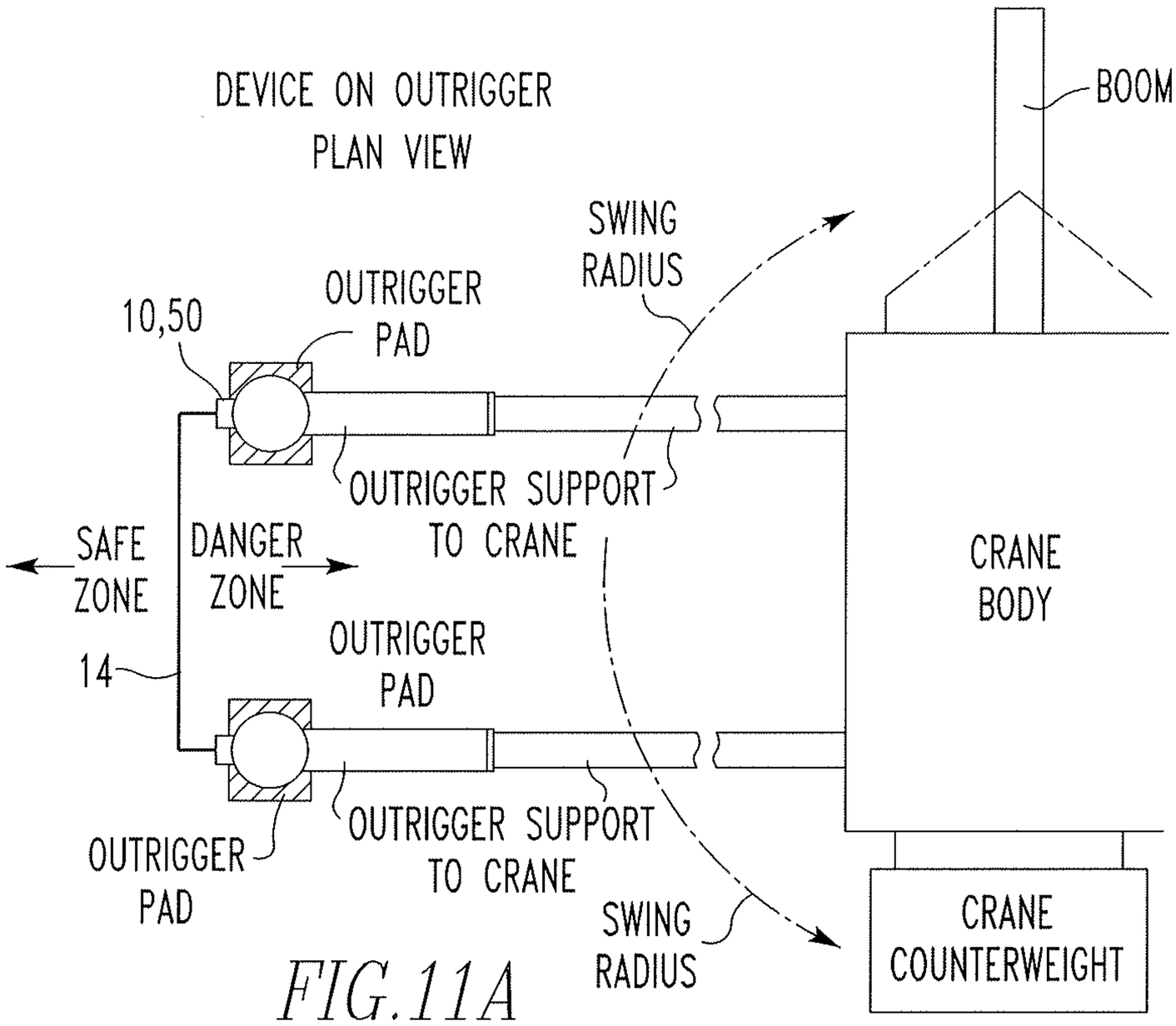

FIG.11A

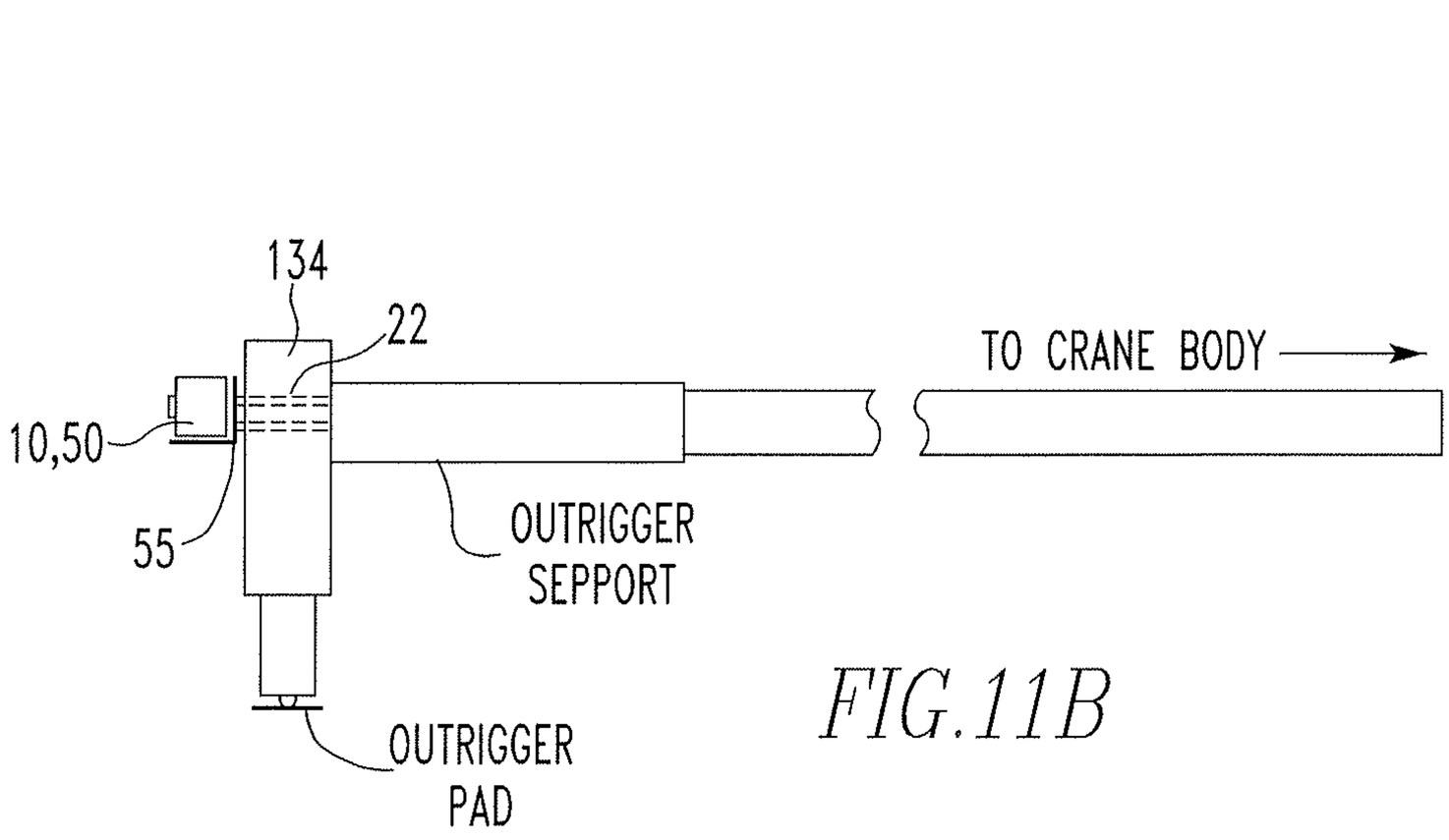

FIG.11B

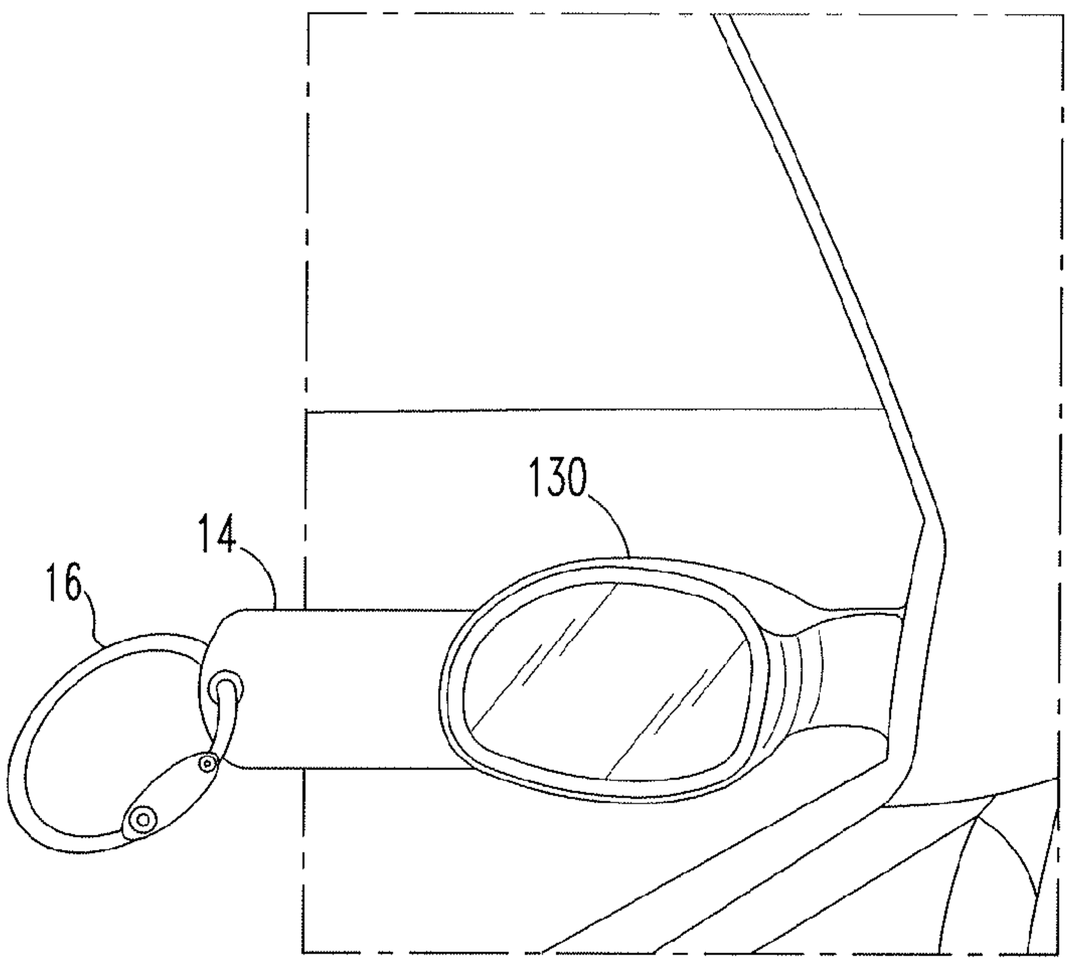

FIG.12A

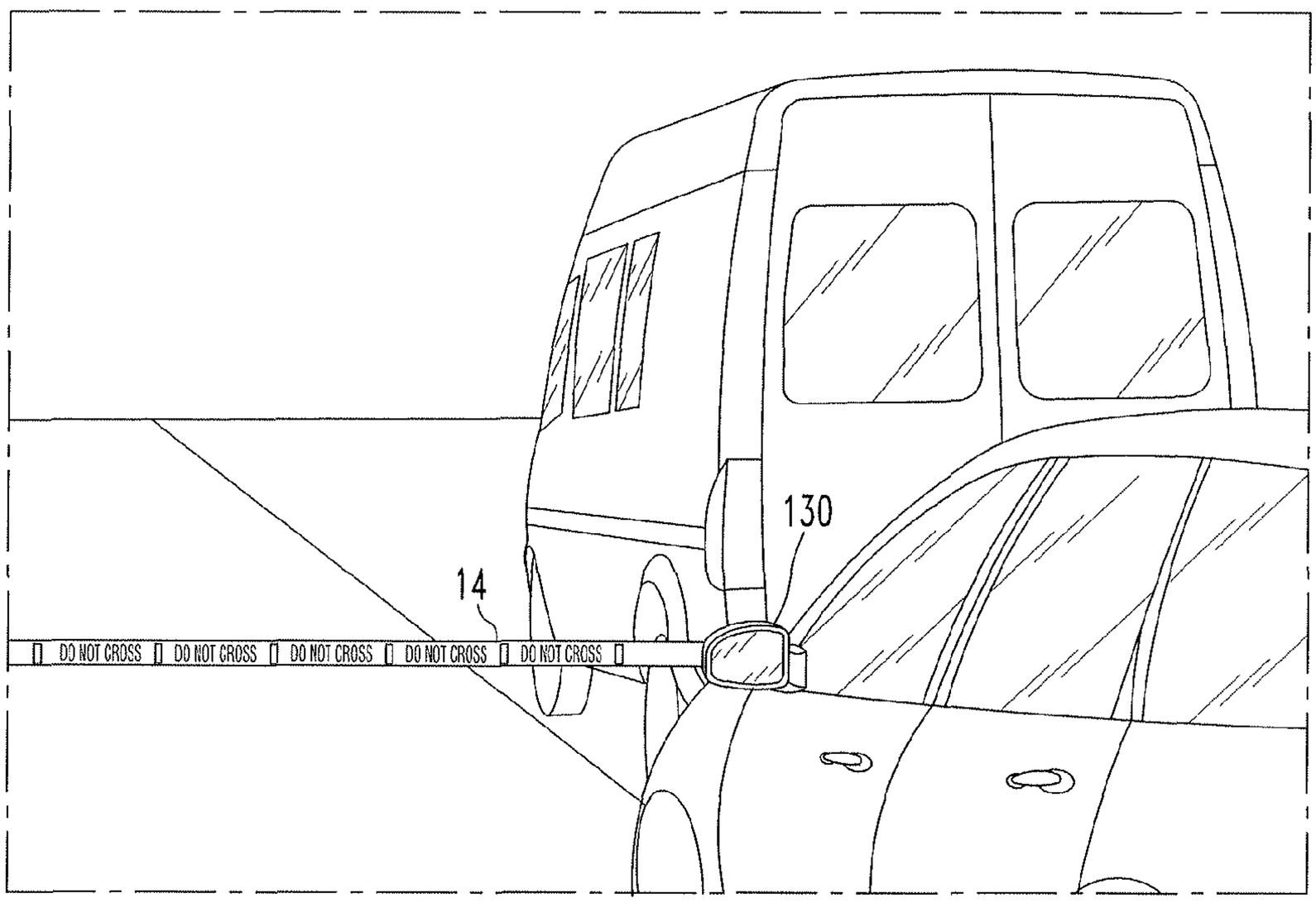
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FIG.12B

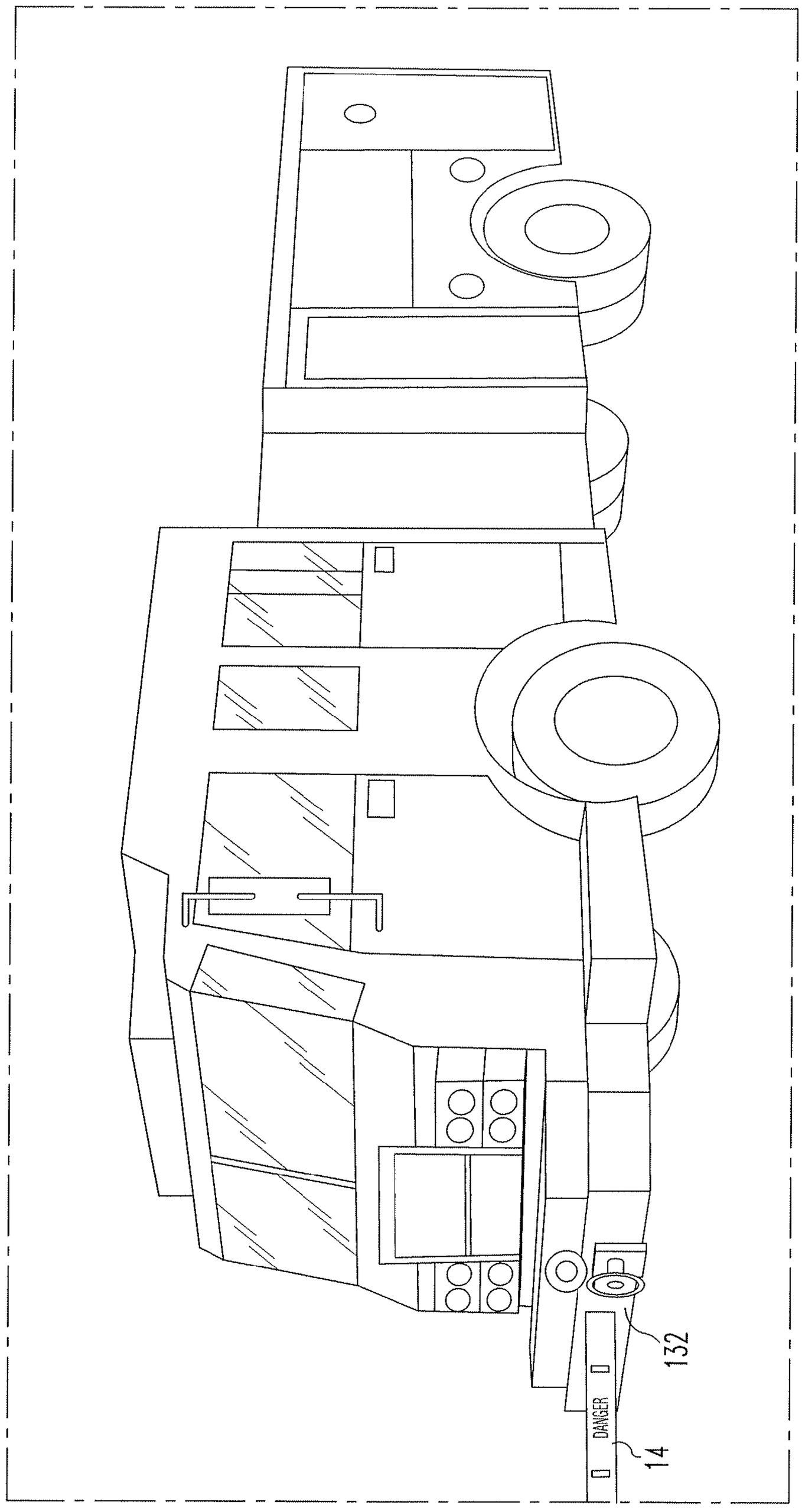

FIG. 12C

RETRACTOR SAFETY DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a Continuation Application of U.S. Non-provisional application Ser. No. 13/617,684, filed Sep. 14, 2012, which is incorporated by reference herein.

FIELD OF THE INVENTION

The present invention is related generally to the field of safety equipment, in particular to retractor safety tape that is easily moved from one work site to another.

BACKGROUND OF THE INVENTION

A user of standard caution tape may tie the flexible, single-use caution tape from one end of, for example, a crane outrigger to the another end in an effort to protect people from entering the dangerous and deadly area known as the swing radius. The standard caution tape must be tied and untied each time the outrigger is moved. The standard caution tape is weak and flexible to the slightest of pressures and offers little to no resistance when pressed against, and frequently stretches to the point of deformation. Often times, the standard caution tape is improperly removed, leaving strands of torn tape tied to machinery and equipment, and many times in the form of a hanging-loop, which is itself a hazard. Standard caution tape has a tendency to tear easily, and many times it can be destroyed inadvertently from a variety of unforeseen events including safety violations, severe wind and weather, as well as wildlife destruction and vandalism. In addition, it is extremely wasteful and very costly to replace standard caution tape with each new use.

Users of standard caution tape include, but are not limited to, all companies under Occupational Safety and Health Administration (OSHA) and Mine Safety and Health Administration (MHSA) jurisdiction, as well as including all construction companies and general industry operations, such as hospitals, airports, police stations, fire departments, government buildings, and car care/automotive repair facilities. Further, companies like ArcelorMittal, US Steel, and BP have a need for such a product due to the high number of hazardous work areas that require protection. Generally, any company that uses standard caution tape, or any other form of area-protection or crowd/pedestrian control, is a potential customer.

Currently there is no product commercially available that is designed to meet all required safety standards in terms of color and indicia and performance, and that incorporates a variety of elements to promote high visibility, ease of use, situational versatility, and operational effectiveness.

SUMMARY OF THE INVENTION

The present invention is a retractor safety device for identifying and controlling hazardous areas associated with unmarked, unbarricaded or unprotected areas of construction and general industry work sites, as well as any application requiring pedestrian movement-control, designed to meet all required safety standards in terms of color and indicia and functionality. The retractor safety device will incorporate a variety of elements to promote visibility and ease of use. The retractor safety device will incorporate functions that promote increased ability to effectively protect from hazardous areas. The present invention is an industrial-grade reusable caution/danger/hazard tape retractor that can attach to a structure (such as an outrigger support post, a post, a wall, a stanchion, equipment, and machinery by means of a universal mounting bracket, includes a manually- or automatically-operated tape-locking mechanism, as well as a quick-connect, universal tape attachment with Lock-Out, Tag-Out (LOTO) capabilities, data logging, and is field cleanable/maintainable. Alternative embodiments of the present invention are integral with the structure or component of the structure (such as an outrigger support or side view mirror **130**). Types of vehicles with a retractor safety device can be passenger vehicles, police vehicles, fire vehicles, public service vehicles, and other emergency vehicles.

The present invention, when compared to other options like standard caution tape and typical tape retractors, has increased versatility in mounting possibilities, self-cleaning, and includes a self-attaching tape connector and a tape locking-mechanism with LOTO capable. With regards to mounting, the present invention can be mounted to any surface/structural shape and the orientation of a mounting bracket to a mounting surface is not fixed along a single axis. The present invention is designed and built in a manner that meets all current and near-term safety standards, which yields a device that is specifically designed to save, time, money, and improved likelihood of preserving life and limb.

In one embodiment, the present invention functions to warn co-workers and others of the dangerous areas within the swing radius of a crane's operating radius by means of a well-defined temporary barrier that acts to cordon off the danger-zone in the area between, for example, outriggers.

In yet another embodiment of the present invention functions as an "area guard" and/or create "controlled access zone" and/or "warning line system" to mark and define the boundary for Fall Protection as prescribed in 29 CFR 1910. and 1926.

As mentioned above, one embodiment of the retractor safety device can be used in conjunction with crane outriggers either removably attached or permanently affixed (such as welded to the frame or support, or integrally formed in the body of the outrigger). In the removable embodiment, a user will attach the multi-purpose, universal mounting bracket to one outrigger on each side of the crane. The user will then attach the safety retractor housing unit to the mounting bracket where the mating surfaces of the housing and bracket are complementary surfaces of any shape and size. The housing unit may or may not be locked to the mounting bracket, by means of a LOTO-capable design feature. The user would then extend the tape-end to the corresponding outrigger via a self-connecting mechanism (such as a Carabineer and Magnetic d-ring), thereby deploying a semi-permanent area-protection barrier, as a means to meet federal requirements to protect a person from entering the deadly swing radius of the crane. The user may also extend the tape end to any other point within the tapes reach. The self-connecting mechanism attached to the tape end is also designed to be Locked-Out, Tagged-Out (LOTO)-capable if so desired. The user can then return to the safety retractor housing, and if so desired, has the option to engage the belt-locking mechanism, which tensions the belt, providing sufficient resistance so as not to deform under pressure, to a given specification. The belt-locking mechanism is also LOTO capable. If a user chooses to engage all LOTO-capabilities, the user will have effectively created a permanent area-protection barrier that meets all federal requirements for area protection relative to protecting against a cranes swing radius, as well being able to satisfy all LOTO requirements. The present invention may incorporate means of both active and/or passive warning systems to further pro-

mote safety such as, but not limited to, insignia, warning lights, audio warnings, flags, strobes, glow-in-the-dark materials, etc. The safety retractor may or may not also incorporate a data log used to track time, date, and duration of belt deployment to better aid organizations in tracking safety procedures and holding accountable those whose failure to follow such procedure. When the barrier is no longer required, the belt can be retracted into the housing, and the housing can be redeployed elsewhere, as needed. In addition, a user of the retractor safety device may extend the tape from its attached position on the crane to any other point within the tape's reach, via a self-connecting mechanism (i.e. Carabineer, Magnetic d-ring). When the barricade is no longer needed, the tape is disconnected from its attachment point, and retracts back into the housing of the retractor safety device.

There are many other applications for the retractor safety device including any scenario where a user may require standard caution tape to cordon off a potentially dangerous area. Another example of this use may be the need to cordon off a work area around a hazardous piece of equipment that needs periodic emergency repairs, and where the user desires to have a temporary barricade on-hand at all times, even on very limited notice, to insure against failed safety measures. All too often situations occur in which a plant mechanic, for example, fails to cordon off a danger-area, because he/she either doesn't have standard caution tape on hand, or they fail to be reminded of the requirement to do so. The retractor safety device, conversely, could be attached to a semi-permanent/permanent location for immediate use whenever it is needed. By virtue of the retractor safety device's design and the universal mounting plate being in a fixed location, it becomes much more likely that the plant mechanic will see the retractor safety device and be reminded to use it to cordon off and protect from potential hazards. Its ease of operation (i.e. no knots, no tangled tape, no tape cleanup, always on-hand) further promotes it's use. Once the retractor safety device is in place, there is little excuse not to use the retractor safety device. The universal mounting plate can also be locked to the retractor safety device and thus becoming a single unit.

Uses of the present invention include any hazard that must be barricaded or cordoned off, according to State and Federal regulations and standards including, but not limited to, OSHA, MSHA, and National Fire Prevention Association (NFPA). Possibly the most important embodiment for the invention, due to current products failure to meet both regulations as well operational standards and performance requirements, is to guard the swing radius between the outriggers of cranes, which is a relatively new mandate from OSHA. Additionally, the retractor safety device has uses at construction and general industry sites that are many due to the sheer number of situations that require barricades and/or warning systems that must meet or exceed specific standards and or requirements governed by many laws/organizations. The present invention can be used in accident investigation and site control. In addition, due to the innocence of public bystanders, the versatility of the universal mounting bracket allows the safety retractor to protect against hazards associated with activities related to police, fire, emergency response, etc.

Another example of the retractor safety device's use can be a temporary work situation, where an employee is asked to do repairs somewhat close to a potential hazard, such as moving equipment. In such a situation, standard caution tape may be ineffective because it fails to provide the necessary resistance needed to prevent an employee from backing into the hazard. The tensioning/locking feature of the retractor safety device will provide the necessary resistance to indicate to someone backing into it, and warning that they are beginning to break the plane designating safety from danger. There are many situation-specific uses that are non-obvious however, as many potential applications relate to temporary situations that are one-time events and completely unforeseeable and circumstantially unique and thus to innumerable to list.

With regards to meeting or fulfilling legal safety requirements, established business goals, and upcoming industry best practices, often times the currently available standard caution tape alone does not fully comply. The present invention differs from current technology being specifically designed (i.e. size, color, verbiage, etc.) to be a retractable and reusable, American National Standards Institute (ANSI) & OSHA prescribed warning/caution/danger tape that incorporates several features such as a universal backing plate, locking tape with minimum resistance (i.e. 16 lbs. min.), tape cleaner, housing has 'chimney' cleaning system, reflective tape, universal tape self-attaching end, lockable tape end and lockable retractor safety device to backing plate in addition to the housing and tape having built-in reusable "tag" for LOTO (Lock-Out, Tag-Out) (and tag only LOTO) applications.

In another embodiment of the present invention, the tape attachment end accepts a selectable strength "breakaway" connector (providing clean break/re-attachment point) allows the tape end attachment to disconnect under excessive pressure and be reattached cleanly without tools.

The universal mounting bracket allows the retractor safety device to be mounted in virtually any orientation. And since the universal mounting bracket can be mounted to a structure or surface by unlimited means, it can be mounted without the need for alteration (i.e. drilling holes) to the attaching structure. This feature represents an ability to attach the device in a variety of ways, in very diverse situations, without need for manufacture approval, which is currently an industry hurdle when using existing retractors. It also allows the retractor safety device to be moved from one hazardous location to another without the need for repeated mounting with tools, since a user may install a number of universal mounting brackets in multiple locations, moving only the retractor safety device as needed. Since the retractor safety device will be able to lock onto the universal mounting bracket, it can be fixed in a semi-permanent manner deterring theft or loss. The retractor safety device housing can be secured to the universal mounting bracket by means of traditional padlock such as for LOTO, key, numerical, electronically, and set screws. The housing and the mounting bracket can include complementary ears or loops with holes that are adjacent to each other when the universal mounting bracket slides onto the housing. A pad-lock, for example, can be inserted through holes of the complementary ears or loops to keep the housing and universal mounting bracket together until the lock is removed. Also, ears or loops can be used on the belt lock such that the switch or lever can be in the LOCK position and a pad-lock can be inserted through both keeping the switch or lever from having the ability to be switched back to the UNLOCK position.

The universal mounting bracket can be attached to the mounting surface in almost anyway such as cam-locking straps, screws, nails, zip-ties, rope, magnets, glue/epoxy, U Bolts, suction cups, adhesive tape, or any other conventional means.

The retractor safety device can also incorporate specifically designed reflective properties to provide visual warning, while specific designs would provide wordage describing the specific hazards being barricaded against.

For a better understanding of the present invention, reference is made to the accompanying drawings and detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustratively shown and described in reference to the accompanying drawings, in which:

FIG. **1** is a pictorial illustration showing an exemplary embodiment of the present invention;

FIG. **2** is a side view of the exemplary embodiment of FIG. **1**;

FIG. **3** is a top view of the exemplary embodiment of FIG. **1** without a cover to show the internal components;

FIG. **4** is a perspective view of another exemplary embodiment of the present invention with an external tape cleaning section;

FIG. **5**A is a side view of an exemplary universal mounting bracket of the present invention;

FIGS. **5**B and **5**C are perspective views of an exemplary universal mounting bracket of the present invention illustrating different surfaces with attachment devices;

FIG. **6** is a pictorial illustration showing one embodiment of the retractor safety device partially engaged with the universal mounting bracket;

FIG. **7** is a pictorial illustration showing one embodiment of the retractor safety device fully engaged with the universal mounting bracket;

FIG. **8**A is a bottom view of the retractor safety device housing of FIG. **4** without the universal mounting bracket;

FIG. **8**B is a bottom view of the mounting bracket with a plurality of attachment devices on bottom surface engaged with the retractor safety device housing of FIG. **4**;

FIG. **8**C is a bottom view of the universal mounting bracket with a singular attachment device on bottom surface engaged with the retractor safety device housing of FIG. **4**;

FIG. **9**A is a top view of an exemplary embodiment of the retractor safety device housing without a cover to illustrate the internal components;

FIG. **9**B is a pictorial illustration showing one embodiment of the tape cleaning mechanism;

FIG. **9***c* is a pictorial illustration showing one embodiment of the tape locking mechanism;

FIGS. **9**D and **9**E are pictorial illustrations showing embodiments of the tape cleaning device having one scrapper and one brush, and two scrappers, respectively;

FIGS. **10**A-C are pictorial illustrations showing one embodiment of lock out tag out mechanism;

FIG. **11**A is a plan view of one embodiment of the present invention attached to an outrigger;

FIG. **11**B is a side view of the present invention attached to an outrigger; and

FIGS. **12**A-C are pictorial views of embodiments of the present invention incorporated into side view mirrors of a vehicle and front bumper attachment to an emergency vehicle.

DETAILED DESCRIPTION OF THE INVENTION

As used herein in the specification and claims, including as used in the examples and unless otherwise expressly specified, all numbers may be read as if prefaced by the word "about", even if the term does not expressly appear. Also, any numerical range recited herein is intended to include all sub-ranges subsumed therein.

The retractor safety device **10** illustrated in prospective view of the exterior of retractor safety device **10** in FIGS. **1** and **2** includes a housing **12**, retractable signal tape **14** with attachment end **16** connectable to equipment attachment end **18** (which is secured to, for example, an outrigger), padding **20**, and attachment devices, such as straps **22**. Straps **22** are of sufficient length to secure housing **12** to, for example, an outrigger. Alternative attachment devices can be magnets, hook-and-eyes, bolts, and screws. As way of an example and not as limitations, retractable signal tape **14** can be an orange or fluorescent color having a width **24** being any acceptable dimension (such as 3 inches) and length **26** being any acceptable dimension. One study indicates that orange is associated with crushing hazard and also conveys possibility of human injury or death, and yellow can mean property damage. The letters **28** imprinted on retractable signal tape **14** can be any visible color (such as black) and any acceptable height **30** (such as 2.75 inches) that will give the desired maximum safe viewing distance (such as 34.275 feet), which corresponds to letter height **30** of 2.75 inches. One embodiment of retractor safety device **10** employees the ratio of letter height **30** to desired safe viewing distance to 1:150. The font of letters **28** can be any acceptable font that provide clear and legible viewing at the desired safe viewing distance. One study indicates the signal word **32** being WARNING means the possibility of human hazard, and CAUTION can be used for property damage situations only. Housing **12** can include safety sign **34** being a triangular shape **36** with varying color combinations, such as a yellow triangle **36** with black outline **38** and black explanation mark **40**, a black triangle with orange exclamation mark, or pinch point symbol with same colors as above. Tape end attachment **16** can incorporate a "breakaway" feature **16**A that allows tape **14** to auto detach in the event of excessive force being applied and allow for a simple clean reattachment. The "breakaway" feature can be accomplished through a variety of means such as, but not limited to, magnetic, clip, or pin.

Now turning to FIG. **3** that illustrates a top view of the present invention **10** of FIG. **1** without a cover to show the internal components of housing **12**. Tape retracting mechanism **42** is received into inner cavity **44** of housing **12**, wherein housing **12** is constructed of 1 (cylinder or sphere) or more sides **46**. Housing **12** is shown with 4 sides as an illustration and not as a limitation of the invention. Other geometric shapes, such as cylindrical and triangle, are also acceptable. Housing **12**, **52** (see FIG. **4**) can be made from two molded pieces (housing **12** and cover **12**A) that allow for easy access to interior **44** for repair/replacement of interior components. Cover **12**A can be the top surface as shown in FIG. **4** or a bottom surface (not shown). One side **46** can include an aperture **47**, such as a slot or hole, to receive tape **14**. A reusable gasket (not shown) can be used for sealing between the two molded pieces. Tape retractor mechanism **42** and tape **14** can easily slide out of housing **12** for repair/replacement. Tape **14** includes a first end (not shown) being wound around reel **42**A (see FIG. **9**A) the tape retractor mechanism **42** and a second end (equivalent to attachment end **16**) being disposed through the aperture **47** of the housing **12**. Tape retractor mechanism **42** can include a commercially available inertia locking mechanism (not shown) to lock the reel **42**A and tape **14** at a desired length. Length of tape **14** can be any desirable length based on the need of the customer and the size of housing **12**. For example, tape **14** can be 30 feet in length. Housing **12** and tape **14** can be made of suitable commercially available materials that are weather, fade, stain, cut, and ultraviolet radiation resistance as well as anti-microbial with high strength capabilities and reflective properties. For example, housing **12** can be made of industrial grade polymer to avoid electrical issues and certifications that are

required if using metals. Further embodiments of housing **12** should not have sharp edges (rounded corners are preferred), and should state the intended uses and warning labels that apply to it.

Continuing with FIG. **3**, a further embodiment of retractor safety device **10** can include a data logger **59** to collect pertinent information required for safety compliance. Data logger **59** can be battery or solar powered or both to automatically record safety critical information such as, but not limited to, the time/date the data logger **59** was deployed, time/date tape **14** was extracted/retracted, and employee ID of the employee who deployed the data logger **59**. Though data logger **59** is illustrated in FIG. **3** as being retained within housing **12**, data logger **59** can also be connected to the exterior surface of housing **12** (not shown). Data logger **59** can be any commercially available data collector/recorder. Data can be transmitted via wireless communications to a host computer with a processor or downloaded via wireless communications or wired communications locally to a handheld device. Data logger **59** can be permanently or removeably attached to housing **12**, **52**.

Now turning to FIG. **4** that illustrates a perspective view of another embodiment **50** of the present invention. Housing **52** is configured similar to housing **12** with the addition of a tape cleaning section **54** shown projecting outward from the main structure of housing **50** on the exterior surface **62** of housing **52**, thereby not being disposed in inner cavity **44** of housing **12**, **52**. Tape cleaning **106** (FIGS. **9**A and **9**B) is capable of engaging the tape **14** while the tape **14** is being drawn from and retracted into the housing **12**, **52**. Tape cleaning section **54** can be integral formed with housing **52** in the same mold or single piece of material. Alternatively, tape cleaning section **54** can be a separately manufactured component (not shown) that is joined or attached to the exterior surface **62** of housing **52** by conventional methods including, but not limited to, welding, screws, bolts, adhesives/epoxy/resin/glue/tape, clamps/clasps, magnets, hook-and-eye device, interference fit mechanism, or other mechanical connectors. The bottom surface **56** of tape cleaning section **54** has a debris expulsion opening **56**A (see FIGS. **8**A-**8**C) to allow debris removed from tape **14** to gravitationally exit from tape-cleaning section interior **49** (see FIG. **3**) but not allow water or other exterior elements into tape-cleaning section interior **49** such that no debris enters inner cavity **44** (see FIG. **3**) of housing **12**, **52**. Debris expulsion opening **56**A is positioned below the tape cleaning device **106** during operation such that debris removed from the tape **14** exits the debris expulsion opening **56**A. An alternative embodiment of a tape cleaning section **54** illustrated in FIG. **3** can include a tape cleaning section **54** with the debris expulsion opening **56**A in interior cavity **44** attached to interior side wall **122** of housing **12**, but still isolating inner cavity **44** from debris retained in tape-cleaning section cavity **49**. FIG. **4** further illustrates tape breakaway connector **58** at end **60** of tape **14** to retain equipment attachment end **16** to tape **14** until design loads are exceeded, at which time tape breakaway connector **58** will break to disconnect tape **14** from the equipment. One embodiment of the present inventions **10**, **50** can include a commercially available warning light and audible warning system **70** shown in FIG. **4**. The warning light and/or audible warning system can be activated simultaneously or individually, and when tape **14** is either deployed or retracted. The warning light and audible warning system **70** can be battery and/or solar powered. The warning light and/or warning light casing (not shown) can also be made of or coated with glow-in-the-dark material such that personnel in the area of retractor safety device **10**, **50** will be warned of a hazard at night when the warning system **70** is not activated. Alternative embodiments can also include resilient edge flaps **124** located in either side of tape entry opening **54**A to further remove any residual debris from tape **14**.

Tape cleaning section **54** houses in its entirety or in part the tape-cleaning device **106** and tape-locking mechanism **68** as shown in FIGS. **9**A-C. Tape **14** enters tape-cleaning section cavity **49** from inner cavity **44** of housing **12** through tape entry opening **54**A and exits tape-cleaning section cavity **49** through tape exit opening **54**B. Tape entry opening **54**A and tape exit opening **54**B are sized to receive tape **14**. Tape entry opening **54**A is adjacent to the aperture **47** of the housing **52**. External tape lock activation mechanism **64** of tape locking control mechanism **68** is adjacent tape cleaning section **54** to activate locking cams **110** such that tape **14** engages locking cams **110** when tape locking mechanism **64** is activated. Tape locking mechanism device **64** is capable of engaging the tape **14** to inhibit the tape **14** for being drawn from and retracted into the housing **52**. It should be understood that the tape lock activation mechanism **64** can be positioned on either side or both sides of the tape cleaning section **54** to accommodate either left handed or righted users. When the locking mechanism device **64** is engaged and disposed between Lock Out—Tag Out clasp **66** (see FIG. **4**), a Lock Out—Tag Out device can be attached.

Now turning to FIGS. **5**A-C illustrating one embodiment of universal mount bracket **55** having side one **72** and side two **74**. Side one **72** can include two or more side attachment devices **76** on its exterior surface **80** to easily slide on and off of facilities apparatus or equipment with mating devices (not shown). Side attachment devices **76** can be a cluster of four (for illustration purposes only and not to limit the invention to any particular number of attachment devices) where each side attachment device **76** can include four legs **84** having an end **84**A attached to exterior surface **80** and another end **84**B attached to plate **86** to form a gap **88** between exterior surface **80** and plate **86**, and openings **90** between legs **84** sized to receive a mating device (not shown) of the facilities apparatus or equipment. Side two **74** can include one or more side attachment devices **78** on its exterior surface **82** to easily slide on and off of facilities apparatus or equipment with mating devices (not shown). Bottom attachment device **78** can be one (for illustration purposes only and not to limit the invention to any particular number of attachment devices) or any cluster of attachment devices desirable. Each bottom attachment device **78** can include six legs **92** (or as many or as few legs as desired) having an end **92**A attached to exterior surface **82** and another end **92**B attached to top structure **94** to form a gap **96** between exterior surface **82** and top structure **94**, and openings **98** between legs **92** sized to receive a mating device (not shown) of the facilities apparatus or equipment. Equipment attachment devices **76**, **78** can be integrally formed from one piece of material or molded structure or joined together by any conventional techniques including, but not limited to, welding, screws, bolts, or clamps. Also, equipment attachment devices **76**, **78** can be integrally formed with universal mounting bracket **55**, such that universal mounting bracket **55** and equipment attachment devices **76**, **78** are one, integral component and not a combination of separate sub-components assembled and joined into one assembly or one component. Surfaces **80**, **82** can be no-slip, no-scratch surface such that the paint on the equipment is not scratch paint. The present invention universal mounting bracket **55** discussed above is versatile being able to connect to virtually anything, by any binding means (i.e. straps, glue, magnet, tape, hardware such as u-bolts, zipties, etc.), using the same mounting bracket. It is not limited to design-specific mounting techniques and does not require physical alteration to mounting

surface. Universal mounting bracket **55** can be any geometric shape as is necessary to mate with various safety retractor housing designs including, but not limited to, concaved-cylindrical housing unit, which will require a concaved mounting plate. Retractor safety device **10**, **50** is deployable without needing tools or a prop, such as a stanchion or cone, because of the universal mount bracket **55**. Retractor safety device **10**, **50** does not require use of special connecting bracket (male/female ends). Retractor safety device **10**, **50** can be mounted on all plains of housing **12**, **52** in any orientation: 1) mounted from the back, 2) mounted from the bottom 3) from the top, and 4) from either side.

Now turning to FIG. **6** illustrating retractor safety device **50** partially engaged with universal mounting bracket **55**. Housing **52** can also include mounting bracket receptor slots **53** to receive and retain universal mounting bracket **55** (see FIG. **4**). During the assembly or installation operation, Retractor safety device **50** with mounting bracket receptor slots **53** sized to receive and retain side one **72** of universal mounting bracket **55** as side one **72** slides within mounting bracket receptor slots **53**. Once retractor safety device **50** slides into full engagement with universal mounting bracket **55**, retractor safety device **50** will sit securely on side two **74** as shown in FIG. **7**. Since the retractor safety device **50** will be able to lock onto the universal mounting bracket **55**, it can be fixed in a semi-permanent manner deterring theft or loss. The retractor safety device housing **52** can be secured to the universal mounting bracket **55** by means of traditional padlock **118** (see FIG. **10**B) such as for LOTO, key, numerical, electronically, and set screws. The housing **52** and the mounting bracket **55** can include complementary ears or loops **126** with holes **128** that are adjacent to each other when the universal mounting bracket **55** slides onto the housing **52**. A pad-lock **118**, for example, can be inserted through holes **128** of the complementary ears or loops **126** to keep the housing **52** and universal mounting bracket **55** together until the lock **118** is removed. Also, ears or loops **126** with holes **128** can be used on the belt lock such that the switch or lever can be in the LOCK position and a pad-lock can be inserted through both keeping the switch or lever from having the ability to be switched back to the UNLOCK position. The universal mounting bracket **55** can be attached to the mounting surface in almost anyway such as cam-locking straps, screws, nails, zip-ties, rope, magnets, glue/epoxy, U Bolts, suction cups, adhesive tape, or any other conventional means.

Now turning to FIGS. **8**A-C illustrating retractor housing **52** from a bottom view before and after installation of the universal mounting bracket **55**. Universal mounting bracket **55** can be installed at least two different ways to position attachment devices **76**, **78** relative to retractor housing **52** for engagement with a facilities apparatus or equipment. FIG. **8**A illustrates a bottom view of retractor housing **52** showing bottom surface **100**, debris expulsion opening **56**A, tape **14**, and mounting bracket receptor slots **53**. FIGS. **8**B and **8**C illustrate retractor housing **52** and universal mounting bracket **55** being fully engaged. As shown in FIG. **8**B, Length L_1 of side one **72** is less than length L_2 between opposing of mounting bracket receptor slots **53**. The difference in lengths (L_2–L_1) provides sufficient clearance for side one **72** to freely slide between mounting bracket receptor slots **53** into the engaged position. As shown in FIG. **8**C, Length L_3 of side two **74** is less than length L_2 between opposing of mounting bracket receptor slots **53**. The difference in lengths (L_2–L_3) provides sufficient clearance for side two **74** to freely slide between mounting bracket receptor slots **53** into the engaged position.

Now turning to FIGS. **9**A-C that illustrates internal components of retractor housing **52** (which are also compatible for use with retractor housing **12**). Tape **14** is wound around tape retracting mechanism **42** and fed between tape gripping surfaces **102** of opposing locking cams **110** of tape locking control mechanism **68**. The two gripping surfaces **102** are positioned parallel to each other. Tape lock activation mechanism **64** moves one or both of the opposing locking cams **110** (relative movement of cams **110** to each other): i) inward to close a gap **104** between cams **110** to substantial a zero gap to frictionally secure tape **14** between tape gripping surfaces **102** such that tape **14** is locked and only able to move under a maximum desire load (i.e. 16 lbs.) or pressure, and ii) outward to open the gap **104** between cams **110** sufficient to frictionally release tape **14** such that tape **14** is free to be drawn out from housing **52** (similar to housing **12**) or free to retract into housing **52** as tape retractor mechanism **42** re-winds by a conventional biasing mechanism (for example, a spring). An alternative tape locking mechanism can be a reel inertia locking mechanism incorporated into the tape retractor mechanism **42**.

As tape **14** is re-wound onto tape retractor mechanism **42**, tape **14** is cleaned of debris by tape cleaning device **106** that can includes one or more brushes **108**. Though FIGS. **9**A-**9**B illustrate two brushes **108**, other embodiments **106**A of the present invention can include scrapper **108**A to replace both brushes **108** (see FIG. **9**E) or one brush **108** (see FIG. **9**D) such that brush **108** opposes a scrapper **108**A or high pressure fluid (air, water, cleaning solvent, or combinations thereof). Debris removed from tape **14** will fall through debris expulsion opening **56**A by way of gravity (without a medium) or fluid (with a medium—air pressure or flow of water or cleaning solvent).

Now turning to FIGS. **10**A-C illustrating one embodiment of attachment end **16** named a carabineer that includes a main structure **112** being substantially C-shaped forming an opening **112**A between ends **112**B, **112**C and having clasp **114** pivotally attached to end **112**C. Main structure **112** can include lock out tag out aperture **120** on end **112**B that aligns with lock out tag out aperture **116** on end **114**A of clasp **114** when clasp **114** is in a closed position as shown in FIGS. **10**A and **10**B. Main structure **112** also includes pivot hole (not shown) on end **112**C that aligns with pivot hole **114**C on end **114**B of clasp **114** to pivotally connect main structure **112** with clasp **112**. When clasp **112** is in the closed position, lock out tag out lock **118** can be fed through apertures **116**, **120** to secure clasp **114** to main structure **112**. Typically, attachment end **16** will be mated with or couple to equipment attachment end **18** (see FIG. **1**) and lock out tag out lock **118** will be attach to secure the connection.

FIGS. **11**A and **11**B illustrate one embodiment of the present invention having the present invention **10**, **50** removably attached to an outrigger support post **134**. An alternative embodiment of the present invention incorporates housing **12**, **52** into the body of the outrigger or outrigger support when formed during manufacturing of the subject support, whereby housing **12**, **52** are integral with one or more components of the outrigger.

Further examples of an integral retractor safety device are embodied in side view mirrors **130** illustrated in FIGS. **12**A and **12**B and vehicle structure attachment **132** illustrated in FIG. **12**C show as being attached to a bumper as an example and not as a limitation. Key components of the retractor safety device discussed above can be incorporated into the side view mirror **130** and vehicle attachment **132** includes, but not limited to, tape retracting mechanism **42**, tape **14**, attachment end **16**, tape cleaning section **54**, tape cleaning device **106**, and tape locking mechanism **64**. Side view mirror **130** and vehicle attachment **132** can be attached to any vehicle including, but

not limited to, passenger vehicles, police vehicles, fire vehicles, public service vehicles, and other emergency vehicles.

As mentioned above, retractor safety device **10**, **50** can include many safety markings and features to assure users are aware of dangerous surroundings. Listed below for illustration purposes, and not to limit the invention, are examples of possible safety markings and features pertaining to the present invention:

A. Signal tape can be Orange, 3" Height minimum;

B. Letters can be Black, 2.75" Height Minimum. This will give a max viewing distance of; 34.375 ft. (minimum letter height for signal word shall be 1 unit of height for every 150 units of safe viewing distance);

C. Use Headline style text;

D. Tape **14** can be ORANGE back ground with BLACK letters (z535-2007 revised standard). Orange is associate with crushing hazard and also conveys possibility of human injury or death/yellow can mean property damage;

E. Signal Word can be WARNING. WARNING means possibility of human hazard, CAUTION can be used for property damage situations only; and

F. Use triangle safety sign, located on the left side of the word WARNING with a Black triangle with orange explanation mark, or Yellow triangle with black outline and black explanation mark, or pinch point symbol with same colors as above.

Another embodiment of the present invention can comply with statutory regulations including, but not limited to:

A. Part vi of the Manual of Uniform Traffic Control Devices(MUTCD)1993 edition FHWA-SA-94-027 and referenced publications;

B. American National Standards Institute (ANSI) Z35.1-1968, Z35.2-1968, Z535 standards and referenced publications;

C. Occupation Safety and Health Administration (OSHA) 29 CFR 1910.144;

D. OSHA 29 CFR 1926.200; and

E. OSHA 29 CFR 1926, 29 CFR 1910 and the general duty clause.

Although the present invention has generally been described in terms of specific embodiments and implementations, the present invention is applicable to other methods, apparatuses, systems, and technologies. The examples provided herein are illustrative and not limiting, and other variations and modifications of the present invention are contemplated. Those and other variations and modifications of the present invention are possible and contemplated, and it is intended that the foregoing specification and the following claims cover such modifications and variations.

The invention claimed is:

1. A retractor safety device comprising:

a housing having an interior cavity and an aperture;

a tape retractor mechanism retained within the interior cavity of the housing,

a tape having a length, a width, a first end and a second end, wherein the first end of the tape being wound around the tape retractor mechanism and the second end of the tape being capable of being disposed through the aperture of the housing; and

a tape cleaning section connected to the housing;

wherein the tape cleaning section comprises:

a first opening through a first wall, a second opening through a second wall, a third opening through a third wall, a fourth wall, a fifth wall, a sixth wall, an interior cavity formed by the first, second, third, fourth, fifth, and sixth walls being connected together to form a substantially sealed enclosure to prevent the influx of debris into the tape cleaning section, and

a tape cleaning device retained within the tape cleaning section interior cavity;

wherein the third wall is perpendicularly oriented relative to the first and the second walls;

wherein a length and a width of the second opening are substantially the same as the length and the width of the tape;

wherein the first opening is adjacent to the aperture of the housing; and

wherein the third opening is positioned below the tape cleaning device during operation such that debris removed from the tape gravitationally exits the third opening.

2. The retractor safety device according to claim **1**, wherein:

the housing further comprises mounting bracket receptor slots; and

a mounting bracket capable of engagement with the mounting bracket receptor slots, wherein the mounting bracket comprises at least two sides, wherein each side comprises at least one attachment device capable of engagement with at least one complementary mating attachment device of a piece of equipment or the facility structure.

3. The retractor safety device according to claim **1**, further comprising a tape locking mechanism connected to the housing, wherein the tape engages with the tape locking mechanism when the tape locking mechanism is activated.

4. The retractor safety device according to claim **3**, wherein the housing further comprises a lock out tag out connection in proximity of the tape locking mechanism such that the tape locking mechanism can be disposed within the lock out tag out connection when the tape locking mechanism is engaged and a lock out tag out device can be attached to the lock out tag out connection such that the tape locking mechanism is retained in an engaged position.

5. The retractor safety device according to claim **3**, wherein the tape locking mechanism comprising a first gripping surface, a second gripping surface in parallel relationship to the first gripping surface, and a tape lock activation mechanism, wherein the tape lock activation mechanism is connected to the first gripping surface to cause relatively movement of the first gripping surface to the second gripping surface.

6. The retractor safety device according to claim **5**, further comprising a second lock out tag out connection in proximity of the tape locking mechanism such that the tape locking mechanism can be disposed within the lock out tag out connection when the tape locking mechanism is engaged and a lock out tag out device can be attached to the lock out tag out connection such that the tape locking mechanism is retained in an engaged position.

7. The retractor safety device according to claim **1**, wherein the second end of the tape comprising a lock out tag out connection.

8. The retractor safety device according to claim **1**, further comprising a passive or an active warning system connected to the housing.

9. The retractor safety device according to claim **1**, further comprising a data log connected to the housing.

10. The retractor safety device according to claim **1**, wherein the second end of the tape comprises a breakaway feature.

11. The retractor safety device according to claim 1, wherein the tape cleaning device comprising one or more brushes.

12. The retractor safety device according to claim 1, wherein the tape cleaning device comprising one or more scrappers.

13. The retractor safety device according to claim 1, further comprising an end attachment connected to the second end of the tape, wherein the end attachment comprises:

a main structure being substantially C-shaped forming an opening between a first end and a second end, wherein the first end includes an aperture and the second end includes a pivot hole; and

a clasp having a first end and a second end, wherein the first end includes an aperture and the second end include a pivot hole, wherein the pivot hole of the clasp is aligned with the pivot hole of the main structure and pivotally connected therewith to pivotally join the main structure to the clasp,

wherein the aperture of the main structure aligns with the aperture of the clasp when the clasp is in the closed position such that a locking device can be disposed through the aperture of the main structure and the aperture of the clasp to secure the connection.

14. The retractor safety device according to claim 1, further comprising at least one attachment device, wherein the at least one attachment device is selected from a group consisting of a strap, a magnet, a hook-and-eye, a bolt, and a screw.

15. The retractor safety device according to claim 1, further comprising at least one attachment device, wherein the at least one attachment device comprises two or more legs connected to a plate forming a gap, wherein the gap being sized to receive at least one complementary mating attachment device of the piece of equipment or the facility structure.

16. The retractor safety device according to claim 1, wherein the housing and the tape contains warning labels.

17. The retractor safety device according to claim 1, wherein the tape cleaning section is retained within the interior cavity of the housing.

18. The retractor safety device according to claim 1, wherein the tape cleaning section is connected to an exterior surface of the housing.

19. The retractor safety device according to claim 1, further comprising a mounting bracket slideably engageable with the housing.

20. The retractor safety device according to claim 19, wherein the mounting bracket further comprises a locking hole, and the housing further comprises a locking hole, wherein the mounting bracket locking hole and the housing locking hole are aligned when the mounting bracket and housing are engaged such that a locking device can secure together the mounting bracket and the housing.

21. The retractor safety device according to claim 1, wherein the housing is integrated into an automobile side mirror or a vehicle structure attachment.

22. The retractor safety device according to claim 21, wherein the vehicle structure attachment is a bumper attachment.

23. The retractor safety device according to claim 1, wherein the housing is integrated into a support of an outrigger.

24. The retractor safety device according to claim 1, further comprising an end attachment connected to the second end of the tape, wherein the end attachment comprises:

a main structure being substantially C-shaped forming an opening between a first end and a second end, wherein the first end includes an aperture and the second end includes a pivot hole; and

a clasp having a first end and a second end, wherein the first end includes an aperture and the second end include a pivot hole, wherein the pivot hole of the clasp is aligned with the pivot hole of the main structure and pivotally connected therewith to pivotally join the main structure to the clasp,

wherein the aperture of the main structure aligns with the aperture of the clasp when the clasp is in the closed position such that a locking device can be disposed through the aperture of the main structure and the aperture of the clasp to secure the connection.

25. The retractor safety device according to claim 1, further comprising a tape inertia locking mechanism connected to the tape retractor mechanism.

26. A retractor safety device comprising:

a housing having an interior cavity, an aperture, and mounting bracket receptor slots;

a tape retractor mechanism retained within the interior cavity of the housing,

a tape having a first end and a second end, wherein the first end of the tape being wound around the tape retractor mechanism and the second end of the tape being capable of being disposed through the aperture of the housing;

a tape cleaning section connected to the housing;

wherein the tape cleaning section comprises:

a first opening through a first wall, a second opening through a second wall, a third opening through a third wall, a fourth wall, a fifth wall, a sixth wall, an interior cavity formed by the first, second, third, fourth, fifth, and sixth walls being connected together to form a substantially sealed enclosure to prevent the influx of debris into the tape cleaning section, and

a tape cleaning device retained within the tape cleaning section interior cavity;

wherein the third wall is perpendicularly oriented relative to the first and the second walls;

wherein a length and a width of the second opening are substantially the same as the length and the width of the tape;

wherein the first opening is adjacent to the aperture of the housing; and

wherein the third opening is positioned below the tape cleaning device during operation such that debris removed from the tape gravitationally exits the third opening;

a mounting bracket capable of engagement with the mounting bracket receptor slots, wherein the mounting bracket comprises at least two sides, wherein each side comprises at least one attachment device capable of engagement with at least one complementary mating attachment device of a piece of equipment or the facility structure;

a tape locking mechanism connected to the housing;

a first lock out tag out connection connected to the second end of the tape;

a passive or an active warning system; and

a data log connected to the housing.

27. The retractor safety device according to claim 26, wherein the tape locking mechanism comprising a first gripping surface, a second gripping surface in parallel relationship to the first gripping surface, and a tape lock activation mechanism, wherein the tape lock activation mechanism is

connected to the first gripping surface to cause relatively movement of the first gripping surface to the second gripping surface, and a second lock out tag out connection in proximity of the tape locking mechanism such that the tape locking mechanism can be disposed within the lock out tag out connection when the tape locking mechanism is engaged and a lock out tag out device can be attached to the lock out tag out connection such that the tape locking mechanism is retained in an engaged position.

28. The retractor safety device according to claim **26**, wherein the housing is integrated into a vehicle side mirror or a vehicle structure attachment.

29. The retractor safety device according to claim **28**, wherein the vehicle structure attachment is a bumper attachment.

30. The retractor safety device according to claim **26**, wherein the housing is integrated into a support of an outrigger.

31. The retractor safety device according to claim **26**, further comprising an end attachment connected to the second end of the tape, wherein the end attachment comprises:

a main structure being substantially C-shaped forming an opening between a first end and a second end, wherein the first end includes an aperture and the second end includes a pivot hole; and

a clasp having a first end and a second end, wherein the first end includes an aperture and the second end include a pivot hole, wherein the pivot hole of the clasp is aligned with the pivot hole of the main structure and pivotally connected therewith to pivotally join the main structure to the clasp,

wherein the aperture of the main structure aligns with the aperture of the clasp when the clasp is in the closed position such that a locking device can be disposed through the aperture of the main structure and the aperture of the clasp to secure the connection.

32. The retractor safety device according to claim **26**, wherein the tape engages with the tape locking mechanism when the tape locking mechanism is activated.

33. The retractor safety device according to claim **26**, further comprising a tape inertia locking mechanism connected to the tape retractor mechanism.

34. The retractor safety device according to claim **26**, wherein the second end of the tape comprising a lock out tag out connection.

35. The retractor safety device according to claim **26**, wherein the housing further comprises a lock out tag out connection in proximity of the tape locking mechanism such that the tape locking mechanism can be disposed within the lock out tag out connection when the tape locking mechanism is engaged and a lock out tag out device can be attached to the lock out tag out connection such that the tape locking mechanism is retained in an engaged position.

36. The retractor safety device according to claim **26**, further comprising a passive or an active warning system connects to the housing.

37. The retractor safety device according to claim **26**, wherein the second end of the tape comprises a breakaway feature.

38. The retractor safety device according to claim **26**, wherein the tape cleaning device comprising one or more brushes.

39. The retractor safety device according to claim **26**, wherein the tape cleaning device comprising one or more scrappers.

40. The retractor safety device according to claim **26**, wherein the tape locking mechanism comprising a first gripping surface, a second gripping surface in parallel relationship to the first gripping surface, and a tape lock activation mechanism, wherein the tape lock activation mechanism is connected to the first gripping surface to cause relatively movement of the first gripping surface to the second gripping surface.

41. The retractor safety device according to claim **26**, wherein the at least one attachment device, wherein the at least one attachment device is selected from a group consisting of a strap, a magnet, a hook-and-eye, a bolt, and a screw.

42. The retractor safety device according to claim **26**, wherein the at least one attachment device is a structure, wherein the at least one attachment device comprises two or more legs connected to a plate forming a gap, wherein the gap being sized to receive the at least one complementary mating attachment device of the piece of equipment or the facility structure.

43. The retractor safety device according to claim **26**, wherein the housing and the tape contains warning labels.

44. The retractor safety device according to claim **26**, wherein the tape cleaning section is retained within the interior cavity of the housing.

45. The retractor safety device according to claim **26**, wherein the tape cleaning section is connected to an exterior surface of the housing.

46. The retractor safety device according to claim **26**, wherein the mounting bracket is slideably engageable with the housing.

47. The retractor safety device according to claim **26**, wherein the mounting bracket further comprises a locking hole and the housing further comprises a locking hole, wherein the mounting bracket locking hole and the housing locking hole are aligned when the mounting bracket and housing are engaged such that a locking device can secure together the mounting bracket and the housing.

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